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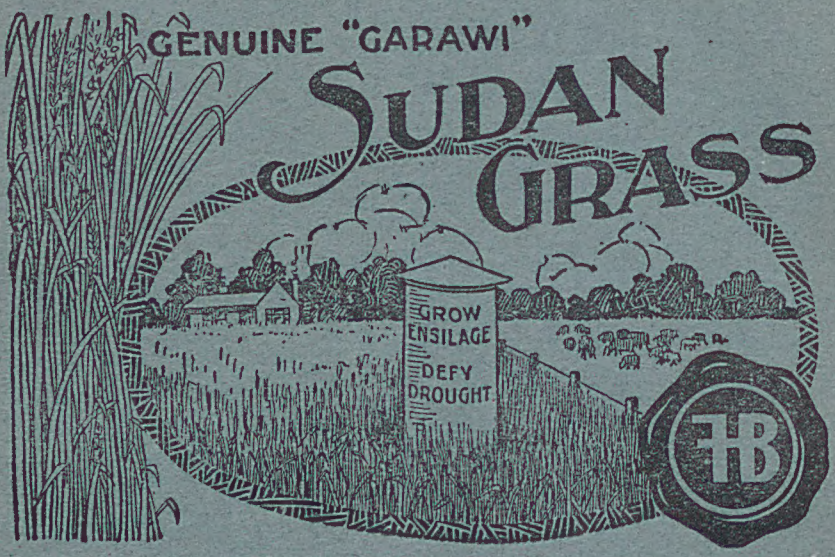

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HON. F. E. OLD, M.L.A.,

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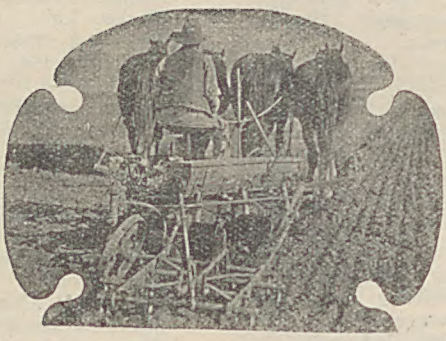

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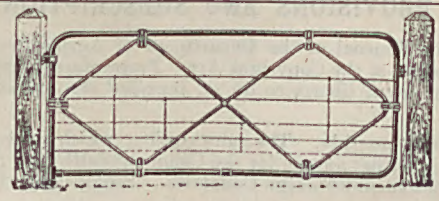

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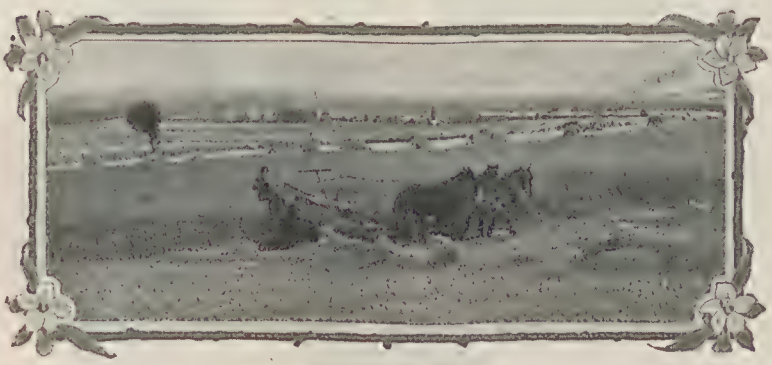

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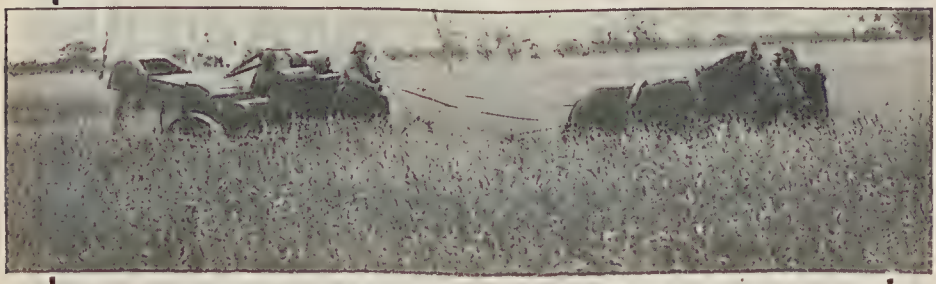

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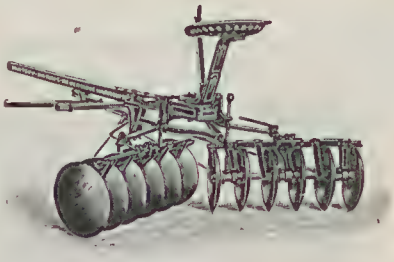

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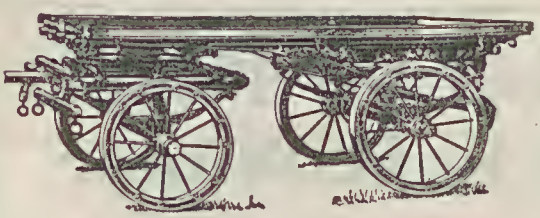

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You may use this letter in any way you think fit, and again thanking you,

I am,
Yours faithfully,
(Signed) WALLIE R. ROBINSON.

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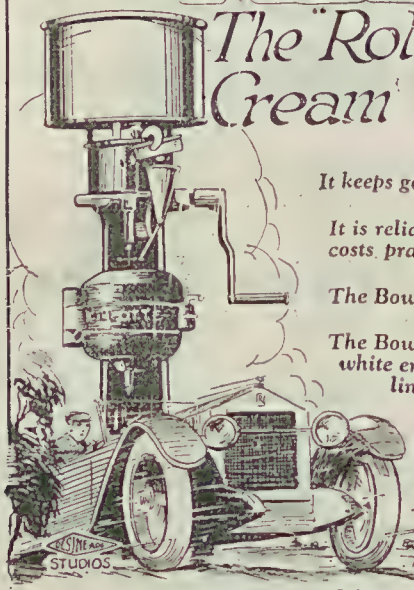

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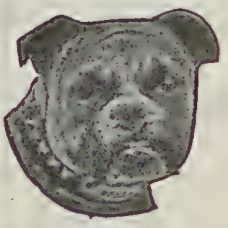

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THE JOURNAL

OF THE

Department of Agriculture

OF

VICTORIA.

Vol. XXI. October, 1923. Part 10.

FIELD DAY AT RESEARCH FARM.

Science and Agriculture.

The Annual Farmers' Field Day at the State Research Farm was held on the 28th September, when about 600 farmers from all parts of Victoria attended, most of them making the journey by special train from Melbourne to Werribee, where they were kindly met by local residents, who conveyed them to the Farm. Among those present were—Dr. E. Page, Acting Prime Minister; the Hon. P. G. Stewart, M.H.R., Minister of Works and Railways; the Hon. L. Atkinson, M.H.R., Vice-President of the Executive Council; the Hon. M. E. Wettenhall, M.L.A., Assistant Minister of Agriculture; and Mr. J. H. Lister, M.H.R.

In welcoming the visitors, Dr. Cameron (Director of Agriculture) apologized for the absence of the Premier (Mr. Lawson) and the Minister of Agriculture (Mr. Old), both of whom had gone to attend the ceremony of turning the first sod of the Moama to Balranald railway.

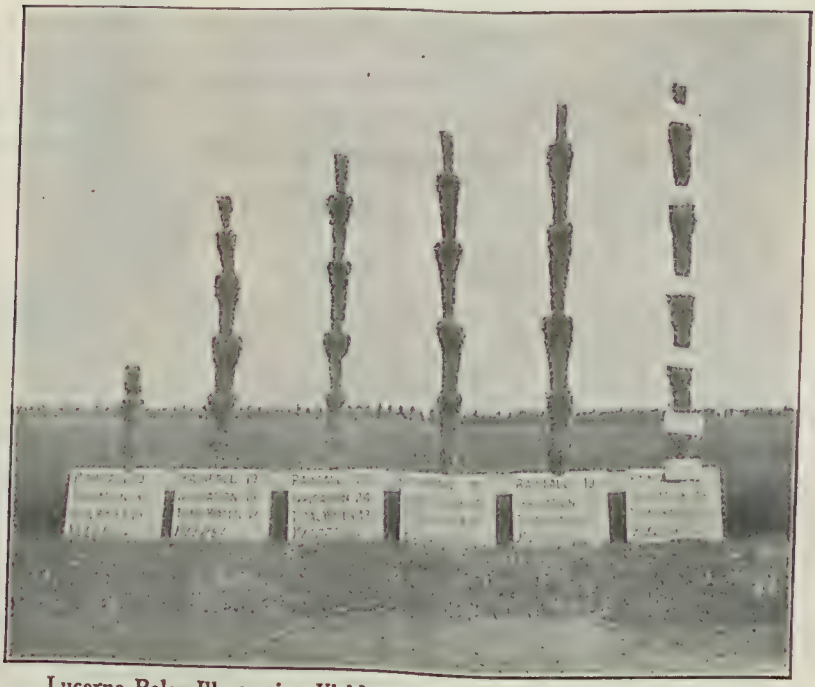
Mr. A. E. V. Richardson (Agricultural Superintendent) briefly outlined the objects of the Farm. In remarking on the backward appearance of many of the crops, he said that, though the average rainfall for the district was 20 inches, the fall from the beginning of the year had so far been only 10 inches, which was only an inch more than the fall recorded for a similar period of the 1914 drought year.

The afternoon's tour was begun with a glance at the various rotation tests, the object of which is to determine the most profitable system of cropping, and, as the plots were passed by, Mr. Richardson made a running commentary on the results obtained from the different rotations.

As in former years, most of the visitors were very interested in the lucerne fields. By means of poles, the increase of lucerne hay obtainable from applications of water was indicated. The results showed that at least 24 inches of water, in addition to the average rainfall, is necessary to maintain favorable moisture conditions, though that quantity does

not set a limit to profitable irrigation. In commenting on the several fertilizer tests with lucerne, Mr. Richardson advocated annual dressings of superphosphate of 2 cwt. per acre, and said that the use of gypsum in combination with superphosphate had given splendid returns. The value of gypsum, Mr. Richardson explained, is chiefly due to its modifying the texture of the subsoil, and allowing the water to percolate more readily, thus favoring the deeper rooting of the plants. The methods of renovating the lucerne stands were described by Mr. Wilson, the Farm Manager, who also described the experiments that are being conducted in the growing of grasses and clovers under irrigation.

The Red Poll and Friesian herds were inspected, and in the course of a brief address Dr. Cameron said the policy of the Department in



Lucerne Poles Illustrating Yield of Lucerne Hay from Application of Varying Quantities of Water.

its live-stock activities was to undertake innovations which were beyond the scope of the ordinary farmer, and which, if successful, would be a gain to the whole State. It was with this object that the Red Poll herd was established many years ago, and the Friesian herd in 1919, the foundation members of which were obtained from the New Zealand Government by the exchange of an equal number of Red Polls. In the last Government Herd Test the Werribee Red Poll herd, which was the largest in the Test, occupied sixteenth place, and Dominion Queen Mercedes, one of the Friesians imported from New Zealand and afterwards purchased by Messrs. Flack and Sewell, was awarded second place in the contest for the *Weekly Times* prize for the greatest butter-fat production over three days.

No Manure. Super. ½ cwt. per acre. Super. 1 cwt. per acre. Super. 1½ cwt. per acre. Super. 2 cwt. per acre.

Representative Samples from Manurial Field, Showing Influence of Superphosphate in Hastening Maturity.

(Photographed in green state.)

The stud cereal plots were visited. In these plots upwards of 1,000 new varieties, chiefly wheat, obtained by hybridization, are in different stages of development, and varieties received from experiment stations in different parts of the world are also being tested in this section.

The visitors were then shown the Permanent Fertilizer Plots, where the value of different kinds and varying quantities of fertilizers could be seen, and on the way back to the farmstead the plots devoted to green manurial and feeding-off tests were hurriedly inspected

Speech by the Prime Minister.

When afternoon tea had been partaken of, Dr. Page (Acting Prime Minister) proposed a vote of thanks to the Government and the officers of the Department of Agriculture. He said he had been delighted to accept the invitation to see what was being done at the Research Farm. It was interesting to him, who came from the northern part of New South Wales, to see some of the efforts that were being made by the Government of Victoria toward making farming more profitable—a problem that was exercising every Government in the world. Every one recognised that, without a prosperous agriculture as a basis of national life, no stable structure could be raised, for it was only upon the progressive prosperity of the primary industries that we could hope to build up any successful system of manufactures.

In Australia, more than in any other country of the world, it was essential that farm life should be made attractive, so that those already on the land might remain there, and more and more be attracted. We had a huge continent with a population of less than 6,000,000, or less than two to the square mile, while in Great Britain there were 380 people to the square mile, and in Belgium more than one to the acre. Japan had a population of three to the acre, and in Java, which was only two-thirds the size of Victoria, there were 40,000,000 people.

Throughout the world the doctrine of effective occupation was being continually spoken, and, therefore, the settlement of our empty lands was a question of greatest importance. What was being done at the Research Farm in the application of science to farming was an important factor in the solution of the problem, and whatever was achieved there would be reflected throughout the whole State. (Applause.)

It was necessary to find out the best way of using water and fertilizers, and it was the proper function of a Government to carry out experiments in these matters, and if the lessons taught by the plots were followed throughout the country, it would be of great benefit to every one. As Dr. Cameron had said during the day, not many farmers could afford to carry out experiments, but at an institution controlled and financed by the Government various object-lessons in the way of progress could be given.

He was particularly glad to know that his colleague, Mr. P. G. Stewart, was co-operating with the Government in setting apart a portion of his farm at Carwarp for experimental work, as the methods followed in other portions of the State might not be suitable for the Mallee.

It was necessary to know what could be obtained from the land with the least drudgery and expenditure of money, and if we could improve the standard of living and reduce the hours of labour, we would see daylight ahead of us. During the last twenty years particularly, the

whole of the improvement in the general standard of living had been borne on the back of the man on the land.

A Voice.—Their backs are nearly broken.

The yield of wheat had increased as a result of improved methods, and in dairying the average quantity of milk per cow had increased 20 gallons per year, and these advances benefited the whole country. The secondary industries should also endeavour to obtain increased efficiency, and so cheapen production that the effective wage would be increased.

The Government of Victoria seemed fully alive to its responsibility in regard to primary production, and he congratulated them on the highly efficient officers who were doing so much to increase the State's prosperity. Dr. Cameron was a man whose reputation was known throughout Australia. Mr. Richardson was doing more for wheat-growing than any one else in the Commonwealth, and Mr. Wilson, the Farm Manager, also deserved high praise. Very often no commendation was given deserving men while they lived, though many were willing to heap flowers on their hearses. (Laughter.) He was glad, therefore, to pay a tribute then to the officers of the Department of Agriculture.

The Hon. P. G. Stewart, Minister of Works, &c., in seconding the vote of thanks, said that the value of the experimental work being done by the Department of Agriculture was gradually being recognised by the farmers of Victoria. Though to-day we were perhaps inclined to smile at the farming methods of twenty years ago, we were apt to forget that in another twenty years some might smile at our efforts. He was of opinion that millions of pounds were being lost annually in Victoria by wrong methods of cultivation, by sowing unsuitable varieties of seed, and from the lack of sufficient fertilizers. Though farmers once looked with distrust on experimental work, that distrust was now dying out, and he believed that the money voted by the Government for experimental work gave greater value to the community than any other portion of its expenditure. He heartily congratulated Dr. Cameron, Mr. Richardson, Mr. Wilson, and the other members of the staff.

The Hon. M. E. Wettenhall (Assistant Minister of Agriculture), in acknowledging the vote of thanks, said he appreciated the response to the Government's invitation to see what was being done in research work at the Farm. The District Council of the Wimmera farmers had requested him to urge the Government to provide more money for the extension of research work, though a few years ago they would have characterized such work as waste, and the Government would learn of this change of opinion from him. He wished the Treasurer were present, for money was wanted for agricultural work, and if he could hear the opinions already expressed, perhaps his heart would be softened.

It was said that some of the young fellows from our agricultural colleges were roaming away to other States because they could not secure land in Victoria. He was glad to say that the Cabinet was considering this matter, and hoped to be able to announce soon that every boy who passed through one of our agricultural colleges would have the opportunity of taking up suitable land.

Dr. Cameron responded on behalf of the few who had been named, and the many whose names were not mentioned, and to whom was due so much of the credit for the work seen that day. He had never been associated with any institution in which the staff so heartily co-operated as at the Research Farm.

He was extremely glad that Mr. Stewart was able to be present. Farming experiments could not go far without the co-operation of the man on the land. The Department had had that co-operation from many, but from none more than from Mr. Stewart. He had long been preaching the gospel of improved methods throughout his district, and, despite duties that had come upon him as a parliamentarian, and more recently as a Cabinet Minister, he was still helping the Department by attending to the details of the experimental work on his farm at Carwarp. More men of his stamp were required. (Applause.) Dr. Cameron concluded by expressing his pleasure that the Federal Cabinet thought the occasion of sufficient importance to be represented by three of its members.

CLEAN MILK SCHEME.

Some interesting particulars are now available concerning a "Clean Milk" Scheme which was operated last year in Birmingham. Under this scheme bacterial counts were taken every day from a sample of the milk sent in by each of the supplying farmers. A bonus was then paid at the end of every month to the 36 farmers whose milk during the month was found to contain the lowest number of bacilli per cubic centimetre. Of these 36 farmers, the 12 whose score was the lowest received one pnny per gallon extra for all their milk, and the next 24 a half-penny per gallon extra. In this way some of the farmers who competed received from £50 to £60 each more for their milk than they otherwise would have received. The following were the best six and the worst six scores (in bacteria per cubic centimetre) during the months mentioned:—

Lowest Scores (Cleanest Milk).

	May, 1922.	August.	December.
1 ..	9,000 ..	3,400 ..	6,650
2 ..	12,000 ..	9,900 ..	7,500
3 ..	14,000 ..	12,000 ..	8,500
4 ..	18,000 ..	12,750 ..	10,900
5 ..	22,200 ..	14,250 ..	12,900
6 ..	32,000 ..	16,000 ..	13,500

Highest Scores (Dirtiest Milk).

	May, 1922.	August.	December.
1 ..	10,744,666 ..	8,070,000 ..	648,800
2 ..	12,000,000 ..	10,488,500 ..	750,000
3 ..	16,042,000 ..	11,640,000 ..	859,500
4 ..	Uncountable ..	12,010,000 ..	1,377,000
5 ..	,, ..	15,035,500 ..	1,950,000
6	Approx. 30,000,000 ..	19,580,000	.. over 50,000,000

Some 80 to 90 farmers in all competed under this scheme, and it is understood that the average bacterial count of half of them was lower than 20,000 per c.c. (From Journ. of Ministry Agric.)

IMPROVEMENT OF MECHANICAL CONDITION OF SOILS AND SUB-SOILS.

With Special Reference to the Use of Gypsum (*calcium sulphate*).

[Paper by H. A. Mullett, B. Agr. Sc., Senior Inspector of Agriculture, and P. Rankin Scott, Chemist for Agriculture, read at the Pan-Pacific Science Congress, Melbourne, August, 1923.]

It is generally conceded that the physical attributes of soils limit the yields of crops, at least as much and as often as the chemical ones. Hence the importance of improving the physical condition. In Victoria the main physical defects may be grouped as—

(1) Defects of texture.

(2) Defects of structure.

On these largely depend percolation, capilarity, aeration, etc., as well as such qualities as ease of tillage, root penetration, etc.

Among soils of unsatisfactory texture may be included those which are too loose, as well as those which are too stiff. The chief drawback of loose soils in a dry climate is the difficulty in consolidating them sufficiently well below the surface to permit the plants to draw on such of the supplies of stored water as can be obtained by capillary action. On the other hand, the loose nature of the soil is of great advantage, in that a surface mulch is readily obtained and maintained.

Interesting examples of soils of this class occur in the north of Victoria, in the Mallee and Wimmera. There the average annual rainfall ranges from 12 inches in the northern part to 17 inches in the south, the soils are fairly rich in plant food, but the particles are somewhat deficient in the power of cohesion. Apparently, the cementing material of the crumbs is weak, because if cultivated when in a dry state to any extent they are easily reduced to a dusty powder to a depth of six or seven inches—a condition detrimental to the growth of wheat there. Recognition of this fact has led the farmers to take special precautions to effect the necessary consolidation of the soil two or three inches below the surface. They do that by—

(1) Ploughing shallowly from 3½ to 4 inches deep.

(2) Tilling only when the soil is moist, and to a regular depth (about 2½ inches).

Wheat is, of course, raised on moisture-conserving fallows. The art of fallowing land there consists largely in pugging the under layers of soil together when they are wet, and then maintaining a shallow mulch on top of the firmly pugged soil. Sheep, horses, etc., are looked upon as valuable aids in affecting consolidation.

As a class, soils which are too loose are deficient in either humus, clay, or other materials capable of cementing the particles together and of giving a reasonably permanent crumb-structure when tilled. In some the looseness is related to the quantity of lime present, and

others are loose merely because they happen to exist in regions where the rainfall is insufficient to pack the particles together.

Among the group of soils of faulty texture in which the particles adhere too strongly are stiff clays and other soils whose particles after wetting and drying cement together, especially at the surface. Examples of the stiff clays occur in the Western Plains (volcanic). Many of these crumble naturally when drying out, and are better worked then. Others, if cultivated much, crumble down to a fine dust, which after wetting and drying sets hard. This condition is detrimental to the germination and growth of plants. Examples of such soils occur in the red clays of the Wimmera and Goulburn Valley. Their amelioration is a pressing problem.

Under the heading soils of faulty structure may be included those in which the subsoil is too porous, as well as those where it is relatively impervious to water. The first mentioned type will not stand drought, and is difficult to irrigate by flooding, because of excessive seepage. The latter include those where the subsoil is merely a stiff clay. In others it is a definite hard-pan layer, such as clay or sand cemented with lime, silica, iron, etc. Soils with hard-pans dry out easily, and readily become water-logged in winter or under irrigation. Few hard-pans are absolutely impermeable to water, hence if the surface soil admits the water slowly enough, there may be no water-logging. Conversely, where the hard-pan is overlaid by a freely permeable material, such as sand or silt, the water-logging is more pronounced.

The most extensive examples of soils of faulty structure are the light soils of the Western Wimmera, where a few inches of fine sand overlies a white cement, which rests on a clay hard-pan, merging into a dense clay a foot or so thick, as at Goroke. Then, many of the Goulburn Valley soils are potentially faulty in structure, in that the subsoil holds up irrigation water sufficiently long to interfere with the growth of crops, like lucerne. In some cases the tap-roots do not penetrate far into the subsoil, and in others the surface roots are forced to feed in a water-logged environment, while the tap-roots feed in a comparatively waterless one.

It is with soils of faulty structure such as has been described that this paper is most concerned.

Some Remedies for Physical Disabilities.

There are a number of well-known remedies for most of the physical disabilities cited. Some, such as rotation systems, are designed to slowly improve the organic content of the soil, and thus the physical properties that it confers. With others it is possible to effect the improvement almost at once. Thus there is under drainage for water-logged soils; lime and gypsum where the texture requires improvement. For hard-pan, subsoiling may often be employed with success, also blasting with explosives. A generally hard-pan is assumed to be out of reach of soil amendments. Each of these methods of soil amelioration is employed in this State, but not to any great extent. So far as humus additions are concerned, the improvement brought about, though probably quite definite, is difficult to measure, even after repeated additions to the soil of substantial quantities of green manure.

Stable manure is not available here in any quantity. Under-drainage is so costly that its use is confined to districts growing high-priced crops. The same applies to subsoiling and blasting. Subsoiling is out of the question where the hard-pan offers much resistance, as in bands cemented with iron, or where it is too deep. One difficulty in blasting is in shattering the subsoil thoroughly, otherwise the holes fill with water, and water-log the plants.

As a soil ameliorant, lime cannot be said to have been exhaustively tested over the whole of Victoria. However, where substantial dressings have been applied to soils of the clay-loam type, as at Werribee, Rutherglen, and in the Western district, little, if any, benefit in texture has been noted, nor are there any very marked increases in production. In tests of more than five years' duration the best increase so far obtained with wheat has been 18 per cent., but in a large number of instances on soils with fairly stiff clay subsoils, there has been no increase whatever. Thus, at the Research Farm, Werribee, where in all five tons of agricultural lime (quicklime) have been applied to the same piece of land during the past eleven years, no increase has been obtained. The following table gives the results. The lime was tested in conjunction with superphosphate, which is a limiting factor to growth:—

Table I.—Tests with Lime on Wheat at Research Farm, Werribee. Average of Eleven Years' Results.

No manure	7·7	bushels per acre.
Super. 1 cwt.	14·5	„ „
Super. 1 cwt. + lime 5 cwt.	14·4	„ „
Super. 1 cwt. + lime 10 cwt.	14·2	
Super. 1 cwt. + lime 20 cwt.	13·9	„ „

However, at Rutherglen, on fairly stiff clay loams, subject to some water-logging in winter, the following average increases have been obtained:—

Table II.—Tests with Lime on Wheat at Rutherglen. Average of Six Years' Results.

——	Average yield.	Increase due to lime.	Per cent. increase due to lime.
	bushels.	bushels.	
No manure	9·7	..	..
Super., 1 cwt.	15·7	..	..
Super., 1 cwt. + lime, 5 cwt.	17·8	2·1	13
Super., 1 cwt. + lime, 10 cwt.	17·4	1·7	11
Super., 1 cwt. + lime, 20 cwt.	18·5	2·8	18

Here the last-named field has received in all five tons of lime per acre. As compared with the plot receiving superphosphate only, the yield has been increased by a maximum of two bushels per annum. The

returns from the field receiving lime in 5 cwt. doses, or 25 cwt. in all, shows the greatest relative increase per unit quantity of lime. Quite possibly this is due to soil amelioration, if not wholly, then in part. The increased crop is worth about 8s. 4d. per annum, valuing the wheat at 4s. per bushel. This has cost 8s. 6d. per annum to produce, valuing the lime at 42s. 6d. per ton. So far the application has not shown a profit, but the residual effect ought to be worth something. The heavier dressings have resulted in a considerable loss. On certain soils, notably at Lilydale and Goroke, applications of lime have been found to increase the difficulty of cultivation.

The Effect of Gypsum.

Applications of gypsum have been fairly regularly made to orchards and vineyards in some of the irrigation districts, notably at Renmark, in South Australia; Mildura, in Victoria; and more recently at Yanco, in New South Wales. The results have given satisfaction, and the use of gypsum is gradually extending. Some of these soils, especially at Yanco, are not very permeable to irrigation water, and definite improvement in this direction has been noted by growers where heavy applications have been made. Also it is believed by them that gypsum would free potash from the soils which are fairly well supplied with it, and hence confer a benefit on the vines, citrus fruits, etc., which appreciate potash.

So far little gypsum has been applied to the refractory clay loams in the irrigation districts of Victoria, other than Mildura, and none for general cropping purposes under dry farming conditions. Gypsum was included in the official lucerne experiments at Werribee in 1920, but the first trials made to test its efficacy in breaking up definite hard-pan in wheat lands were commenced at Goroke in 1921, in May of that year. The soil (already briefly described) was definitely faulty in structure. The cement layer and the clay so hold up the winter rains that the soil assumes a water-logged condition, and is said locally to be "spewy." This is often so pronounced that horses are liable to break through the crust of even virgin land, and penetrate to the hard-pan. If attempts are made to cultivate land when approaching this condition, it may be reduced to a thick greyish slush, which on drying sets like mortar. Lime was not at first applied to these soils, because it was known that quite a good "concrete" for building the walls of houses could be made by mixing the surface soil with about 20 per cent. (by weight) of slaked lime. It was thought that lime would tend to cement the upper layers of the soil, though that has yet to be proved. Lime has been included in the tests this year.

In using gypsum at Goroke, it was thought that it would afford a critical test of the flocculating powers of this salt, and it was especially intended to find out whether heavy applications on the surface would affect a subsoil layer a couple of feet thick. The gypsum was applied at the rate of 1½ tons per acre, together with 1 cwt. of superphosphate per acre (18 per cent. P_2O_5). This was done because the soil was markedly deficient in phosphoric acid, which constitutes one of the principal factors limiting growth. Both the superphosphate and the superphosphate and gypsum applied together gave most remarkable increases in yield These were confirmed by a duplicate set of plots laid down in the following year (1922).

Table III.—Experiments with Wheat at Goroke. Results 1921-1922.

—	1921.	1922.	Average, two years.
	bushels.	bushels.	bushels.
No manure	6·5	9·0	7·7
Basic phosphate, 1 cwt.	14·7	16·7	15·7
Super., 1 cwt.	16·3	15·1	15·7
Super., 1 cwt. + gypsum, 1½ tons	27·4	25·6	26·5
Super., 2 cwt.	21·4	20·2	20·8

Size of plots, ¼ acre each.

Five manurial plots were sown each year on fallow with Federation wheat. 70 lbs. per acre. Seeded end May.

The land was virgin soil and typical of a large area.

Phosphatic manures, at the rate of 1 cwt. per acre, it will be noted, have raised the yield by eight bushels per acre, i.e., about 104 per cent. One and a half tons of gypsum increased the yield obtained from 1 cwt. of superphosphate by an average of 10.8 bushels, *i.e.*, by a further 69 per cent. This increase is many times in excess of that hitherto obtained in Victoria by the use of any lime derivative in official tests. The application of 2 cwt. of superphosphate by itself increased the yield substantially, as compared with 1 cwt. It is as yet a matter of supposition as to what would have happened had the gypsum been applied with this quantity of superphosphate. But it seems reasonable to infer that the yield would have been still further enhanced. Subsequent to the first year of the Goroke experiments, applications of gypsum were made to wheat at Cavendish, 70 miles further south, on a silty soil, which overlies yellow clay at a depth of three feet. The rainfall here is about 32 inches annually. Also at Torrumbarry (15 inch rainfall), near Echuca, on a stiff red clay, on a windswept plain, and at Willaura, on a fairly well drained sandy loam, somewhat inclined to acidity.

At Cavendish it is difficult to grow two profitable crops on the same land without a prolonged spell. Growth is satisfactory for a couple of months, but subsequently it becomes stunted, and is very liable to attacks of takeall (*ophiobolus gramminis*). The experiments were conducted on land previously cropped. The yields are, therefore, low. The yields of the check plots accord well with average yields obtained on old land. The percentage increases due to gypsum are, however, even heavier than those at Goroke.

Table IV.—Tests with Gypsum on Wheat.

—	Yield.	Increase *above* super., 1 cwt.	Increase per cent.
	bushels.	bushels.	
No manure	1·4	..	..
Super., 1 cwt.	5·6	..	..
Super., 1 cwt. + lime, 10 cwt.	7·8	2·2	39
Super., 1 cwt. + gypsum, 1½ tons	10·9	5·3	94
Super., 1 cwt. + gypsum, 3 tons	14·6	9·0	160

An application of three tons of gypsum to 1 cwt. superphosphate has increased the yield by 160 per cent., as compared with 1 cwt. superphosphate by itself. With a ton and a half of gypsum the corresponding increase was 94 per cent.

Typical Goroke Country.

The Torrumbarry figures are as follow:—

TABLE V.—EXPERIMENTS WITH WHEAT AT TORRUMBARRY.
RESULTS, 1922.

	Yield.	Increase due to fertilizer and amendment.	Increase due to gypsum.	Per cent. increase.
	bushels.	bushels.	bushels.	
No manure	5·3	..	..	..
Super., ½ cwt.	7·7	2·4	..	..
Super., 1 cwt.	7·7	2·4	..	..
Super., 1½ cwt.	7·7	2·4	..	..
Super., 1 cwt. + gypsum, 3 tons ..	9·3	4·0	1·6	21

The season was dry, and the yields were low. The gypsum was responsible for an increase of 21 per cent. Here the texture of the surface soil was markedly improved.

At Willaura, on the loamy soil, the increased yield attributable to 30 cwt. gypsum was 6.7 per cent. only. Ten hundredweight of lime produced a greater increase.

Table VI.—Experiments with Wheat at Willaura. Results, 1922.

—	Yield.	Increase due to fertilizer and amendment.	Increase due to amendment.	Per cent. increase.
	bushels.	bushels.	bushels.	
No manure	9·4	..	..	..
Super., 1 cwt.	20·9	11·5	..	..
Super., 1 cwt. + gypsum, 3 tons ..	22·3	12·9	1·4	6·7
Super., 1 cwt. + lime, 10 cwt. ..	22·5	13·1	1·6	7·1

Gypsum was applied here because there happened to be a deposit within half a mile of the experiments.

With lucerne, at Werribee, three years' tests, commenced in 1920, show that gypsum is apparently superior to lime, but, as compared with superphosphate, the increases attributable to the amendments are relatively low.

Table VII.—Experiments with Lucerne, Research Farm, Werribee. Average Results, 1920-22, Inclusive.

—	Yield.	Increase due to fertilizer and amendments.	Increase due to amendments.	Increase per cent.
	cwt.	cwt.	cwt.	
No manure	116·8	..	..	..
Sulphur, 1 cwt.	129·4	13·6	..	..
Super., 1 cwt.	135·3	18·5	..	..
Super., 2 cwt.	143·6	26·8	..	..
Super., 3 cwt.	146·3	29·5	..	..
Super., 4 cwt.	151·6	34·8	..	..
Super., 2 cwt. + gypsum, 1½ tons ..	158·2	41·4	14·6	10
Super., 2 cwt. + lime, 10 cwt. ..	138·9	22·1	Decrease	..
Super., 2 cwt. + lime, 20 cwt. ..	142·9	26·1	Decrease	..

Thus the increase attributable to gypsum is 14.6 cwt., equal to 10 per cent. of that product by superphosphate, 2 cwt.

The results of the field tests cited may be summarised thus:—The increased yields attributable to gypsum range from 6.7 per cent. to 160 per cent. for wheat. For lucerne, at Werribee, the increase is 10 per cent. The greatest percentage increase was obtained at Cavendish, following an application of three tons of gypsum per acre. The only other substantial increase was that at Goroke, where 30 cwt. of gypsum was used. It is significant that at both these centres water-logging of the soil is most pronounced.

Possible Cause or Causes of the Increased Yields.

Gypsum has been used for many years for increasing the yields of crops, more especially in other parts of the world. Thus thirty years ago it was proved to substantially improve the yield of vines on certain soils in France. Then followed a regular boom in its use there.

Numerous workers have enquired into the cause of the increases obtained, and many investigations have been made into the effect of the gypsum on soils. Among the things claimed for it in specific instances are the following:—

(1) Liberates potash in an available form.
(2) Stimulates symbiotic bacteria in certain legumes.
(3) Neutralizes deleterious substances, such as sodium carbonate.
(4) Lime and sulphur supplied as plant foods.
(5) Weakens the basic reaction resulting from plant growth and so assists in the retention of a loose texture by the soil.
(6) Flocculates "colloidal clay," and hence improves the texture of the soil.

The claims that potash is liberated have been generally accepted for many years, and more recently have been confirmed by D. K. Tressler, G. B. Lipman and W. F. Gericke, and P. R. Miller. Tressler (Soil Science, 6 (1918), No. 3, pp. 237-257) conducted experiments which appeared to show that potash was liberated by the use of gypsum in most fertile clay loams. Little was released in sands and silts tested. The work of Lipman and Gericke (Univ. Cal. Pub. Agric. Sect. 3 (1918), No. 10, pp. 277-282) incidentally confirmed this result. Potash was found to be rendered more soluble by the addition of either calcium, carbonate, or calcium sulphate, in a clay adobe soil, but not in the case of a "blow sand."

P. R. Miller (*Jour. Agric. Research,* 14 (1918), No. 1) showed that soils mixed with one per cent. gypsum and kept moist as in the field, showed marked increases in the content of water soluble potash. However, L. T. Briggs and J. F. Breazeale (*Jour. Agric. Research,* 8 (1917), No. 1, pp. 21-28) showed that in certain soils derived from orthoclase felspars, the solubility of the potash may be depressed by the use of gypsum. Evidently, then, potash may, or may not, be liberated by gypsum, depending on the type of soil treated.

It is quite possible that liberation of potash has played some part in increasing the yields at Goroke, but as wheat has not responded to potash elsewhere in Victoria, this aspect has not yet been investigated. The gypsum used itself contains some potash. The amount applied in this way would be equivalent to about 20 lbs. potash sulphate per acre. Probably this would satisfy the needs of the crop. The following is an average analysis of the samples of gypsum used:—

Sulphuric anhydride (So_3)	41·09 per cent.
Sulphuric, calculated as ($CaSO_4 2H_2O$) ..	88·35 „
Phosphoric acid (P_2O_5)	·021 „
Potash (K_2O)	·419 „
Potash as sulphate (K_2SO_4)	·776 „

Stimulation of Nodule Bacteria.

In America and elsewhere gypsum has effected notable improvement in legumes, such as lucerne and red clover. W. Pitz (*Jour. Agric. Research,* Jan., 1916) showed that certain increased yields in red clover treated with gypsum were associated with increased development of the root nodule bacteria. This work received corroboration from that of H. G. Miller (*Jour. Agric. Research,* vol. XVII., June, 1919). As wheat has no nodules, this cannot be regarded as a cause, but it is a possible explanation of the small increased yield of lucerne obtained at Werribee.

Neutralization of Deleterious Substances such as Sodium Carbonate.

It has been claimed that on soils affected with black alkali (sod. carb.), an application of gypsum leads to a double decomposition with the formation of two innoxious substances, calc. carbonate and sodium sulphate. However, as these soils tested are not obviously affected with deleterious salts this aspect has not yet been investigated.

Lime and Sulphur as Plant Foods.

It is possible that plants are able to derive both these substances ultimately from gypsum. The soil, however, contains enough lime to furnish the quantity of this substance required as plant food. Sulphur has recently been proved of more importance as a plant food than was formerly supposed. Applications of two cwt. of sulphur spread over two years have resulted in an increase of 11 per cent. in the yield of lucerne at Werribee. Curiously enough, this increase is very much of the same order as increase in lucerne attributable to gypsum there. Possibly then, this is the explanation for the increase due to gypsum there. But it is unlikely that the deficiency in lime and sulphur as foods is limiting growth seriously at Goroke. At any rate, it can only be part of the explanation.

"Weakens Basic Reaction Resulting from Plant Growth and so Assists in the Retention of a Loose Texture by the Soil."

This theory has been put forward by O. Nolte (*Jour. Chem. Soc., Lond.*, 112 (1917), No. 660, pp. 624). It is claimed that in certain soils that gypsum undergoes hydrolytic decomposition into acid and base and hence influences the reaction of the soil, especially by virtue of the constituent with the predominating reaction—*i.e.*, sulphuric acid. This is said to weaken the basic reaction resulting from plant growth, and so assists in the retention of a loose texture by the soil. The theory has not yet been confirmed by other workers.

Flocculates Colloidal Clay and hence Improves the Texture of the Soil.

It is a matter of every-day laboratory observation that gypsum, in common with a number of other soluble salts, such as sulphates, chlorides, *e.g.*, ferrous sulphate, sodium chloride, ammonia sulphate, also hydro-oxides, *e.g.*, Ca $(OH)_2$, will flocculate suspensions of clay in water, and hence precipitate them. C. A. Jensen (*Jour. Afric. Research* (1918), pp. 505-518) showed that they reduce the percentage of colloidal substances, mainly clay, present in certain soils. Others, including O. Nolte (Landw. Vers. Sta. 98 (1921), No. 3-4) showed that

solutions of gypsum and other salts increase the permeability of soils. And the inference is that the flocculation of the colloidal particles frees the clogged pores of the soil.

Some Notes on the Present Investigation.

As both the Goroke and the Cavendish soils water-log badly because of a very impervious clay subsoil in a highly "colloidal" state, it was concluded by the writers that possibly the main effect of the gypsum was a partial flocculation of this clay. The clay is very finely divided and densely packed. The aggregation of the particles into groups should permit of greater permeability and of a general physical improvement. Accordingly investigations were undertaken, the scope of which included the sampling of the treated and the untreated field plots, and a determination of the amount of "colloidal" clay in each at the end of one year's and two years' treatment. It will be recognised that there is considerable difficulty in making satisfactory comparisons with samples taken under field conditions, because at best the samples must represent a very small proportion of a very variable whole. Nevertheless, it was thought that the effects at Goroke and Cavendish were critical cases well worth testing. Later on, it is proposed to apply gypsum to these soils under controlled conditions in the laboratory. As time permits, a comprehensive study will be made of the effect of gypsum on plant growth, and on the physical properties of the soil. The Goroke soil was selected for the initial work because here the clay is near the surface. Hence the difficulties of sampling were reduced.

Represented diagrammatically, the "soil profile" of the Goroke soils is as follows:—

	ft.	in.
Soil (fine sand)	0	2¾
White cement sand	0	3
Hard dark-brown clay densely packed and showing columnar structure	0	4¾
Soft dense yellow clay	1	7¾
	2	6

Clay with Sand and Marl.

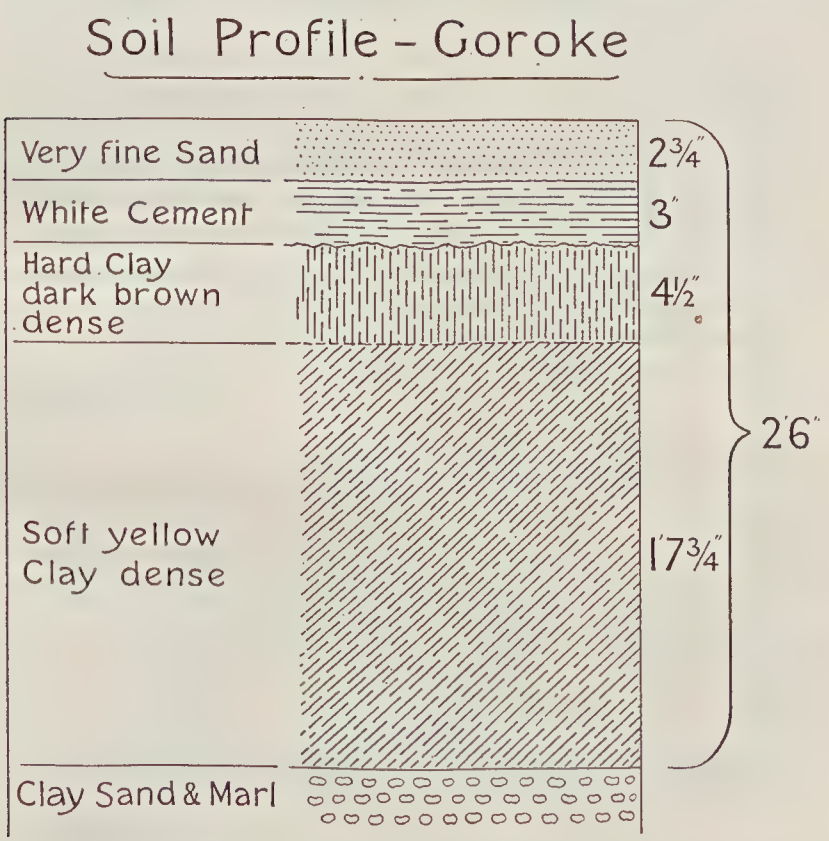
The following is a mechanical analysis of a typical Goroke soil by the Sudan method:—

——	Very coarse sand.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.	Moist.	Total.
	%	%	%	%	%	%	%	%	%
Soil ..	·48	12·84	17·88	20·72	37·28	1·18	8·78	·64	100·00
Cement ..	·32	7·96	15·28	30·24	33·48	1·80	10·70	·22	100·00
Hard clay	·16	3·04	7·92	14·80	18·82	3·00	49·90	1·36	100·00
Soft clay	·00	3·12	6·16	12·64	14·64	3·36	58·11	1·97	100·00

The soil and the cementing layers are, therefore, composed largely of fine sand with a small percentage of clay. These overlie a subsoil containing a very high proportion of clay.

The method selected for the determination of the percentage of "colloids in suspension," was that cited by C. H. Jensen (*Jour.*

Agric. Research, Dec., 1918, pp. 505-518) slightly modified. Five grams of soil were placed in a 250 c.c. Erlenmeyer flask, 50 c.c. distilled water added, then placed on a water bath for one and a half hours, the flask and contents being periodically shaken. The liquid portion was then decanted into a cylinder of 3 cm. diameter and 25 cm. high. This process was repeated twice. The liquid, with clay in suspension in the cylinder, was made up to 180 c.c., well agitated, and left to stand 24 hours. The suspended matter was siphoned off and precipitated with neutral sulphate of ammonia, then filtered, ignited, and



weighed as " colloids " in suspension. It is recognised that the method does not give the total " colloids " in suspension, and the results cannot be used for comparisons with the Sudan method. But Jensen proved that satisfactory comparisons could be made of treated and untreated soils. With this the writers are in agreement. Duplicate determination of the " colloids " with same sample gave—

13.48 per cent.
13.86 per cent.

And in another—

9.57 per cent.
10.22 per cent.

The "colloids" in the main are "colloidal" clay, a term first suggested by Schloesing, and which was adopted by Hilgurd and other workers. If refers to the finest clay particles which readily enter water suspension, and can be precipitated from it by certain salts. Colloidal clay has jelly-like properties.

There are two experiment fields at Goroke, each divided into a number of ¼-acre plots. One field was sown to wheat in 1921 after fallow, and the other in 1922. There were thus available for sampling treated and untreated plots for each year. At first samples of each layer of soil and subsoil to a depth of 2 ft. 6 in. were obtained in two places in each plot. When these were analyzed, it was found that the soil variations were as great as any that could have been expected from the gypsum. It was then decided to obtain a large number of samples from each plot, so that a reasonably fair average of each plot could be obtained. This was done with a soil augur. Fifteen samples of each layer of soil and subsoil were obtained from each of the four plots, *i.e.*, two treated and two untreated. The composite samples were analyzed with the following result:—

TABLE VIII.—SHOWING PERCENTAGE OF "COLLOIDS IN SUSPENSION" IN EACH LAYER OF TREATED AND UNTREATED PLOTS.

I. Wheat sown and gypsum applied 1921; sampled 1923—

Section.	No manure.	Gypsum and Superphosphate.
	per cent. colloids.	per cent. colloids.
Soil	·44	·42
Cement	·90	·71
Hard clay	25·99	20·34
Soft clay	33·85	22·83
	61·18	44·30
Average per cent. colloids	15·29	11·07
Reduction due to gypsum	4·22	

II. Wheat sown and gypsum applied 1922; sampled May, 1923—

Section.	No manure.	Gypsum and Superphosphate.
	per cent. colloids.	per cent. colloids.
Soil	·26	·46
Cement	·43	·84
Hard clay	20·16	23·80
Soft clay	24·46	12·06
	45·31	37·16
Average per cent. colloids	11·33	9·29
Reduction due to gypsum	2·04	

Subsequently equal quantities of each section were mixed, and determinations in duplicate made, with the following results: —

Table IX.—Showing Percentage of "Colloids in Suspension" in Composite Samples of Treated and Untreated Soils.

I. Wheat sown and gypsum applied in 1921; sampled May, 1923—

	No manure.	Gypsum and Superphosphate.
	per cent. colloids.	per cent. colloids.
Per cent. colloids in composite sample	13·48	9·57
	13·86	10·22
	27·34	19·79
Average	13·67	9·89
Reduction in colloids due to gypsum	3·78	

II. Wheat sown and gypsum applied 1922; sampled May, 1923—

	No manure.	Gypsum and Superphosphate.
	per cent. colloids.	per cent. colloids.
Per cent. colloids in composite sample	11·37	7·35
	11·30	8·67
	22·67	16·02
Average	11·33	8·01
Reduction in colloids due to gypsum	3·32	

The tables show that the percentage of colloids has been reduced by an average of over three per cent. on the total measurable quantity in the soil. The soft clay, which occurs at a depth of about a foot, and is 1 ft. 7 in. thick, appears to be most affected, and the figures show that the reduction of the colloids in suspension, in this case, is about one-third in the case of the 1921 sown plots, and one-half in the case of the 1922 sown plots. The average reduction in these two layers is between 11 and 12 per cent. "colloids," i.e., about 40 per cent. In a soil whose pore space can be pictured as clogged with gelatinous clay, a reduction of this order should make a significant difference in its permeability.

It is probable that greater results cannot be expected by an application of this amount of gypsum, because 30 per cent. does not contain sufficient of the mineral to precipitate all the clay in an acre of soil two feet deep. An attempt was made to roughly gauge the gypsum requirement of this Goroke soil, assuming that a complete alteration in the clay to a depth of two feet was required, and could be effected.

A series of water suspensions of the clay was prepared by shaking up five grams of a composite sample of the untreated soil with 180 c.c. of water. These were treated with varying quantities of a saturated solution of gypsum. The minimum quantity of this solution required to precipitate in 24 hours the suspended matter was 5 c.c. Calculating each acre foot of soil as 3,500,000 lbs., and the solubility of the gypsum as two parts per thousand, this gives a gypsum requirement of 3,134 tons

per acre foot, or about six tons for two feet. Hence, if the assumption is correct, under the most favourable circumstances, it would require six tons of gypsum to completely alter the clay to a depth of two feet. From this it can be deduced that to obtain the maximum effect heavier dressings than 30 cwt. are necessary.

Economic Significance.

It is, perhaps, too early to attach much economic significance to these somewhat imperfect results at this stage. For one thing, it has not been proved that lime will not produce the same result if applied at the same rate as gypsum at Goroke and Cavendish, though that is rather improbable. Slaked lime is an excellent agent for flocculating suspensions of clay in water; but when placed on a soil it reverts fairly rapidly to the carbonate form, which is practically insoluble in water. Thus it appears likely that lime would be slower in its action than gypsum, because it does not get into the soil solution so readily. Again, lime has been found to aggravate the cementation of some soils in Victoria. O. Nolte (Landw. Vers. Sta. 8 (1921), No. 3-4, pp. 135-153) has shown that on a "puddled humus soil" lime had no more influence in increasing the permeability than water, while gypsum increased it. The efficacy of gypsum may serve to some extent to explain the remarkable potency of superphosphate as a fertilizer under Australian conditions. The usual application ranges from ½ cwt. to 1½ cwt. per acre. Each hundredweight of the fertilizer consists of 55 lbs. gypsum. Thus, in the course of ten years 5 cwt. of gypsum are applied in this way. Is it not possible that this quantity is sufficient to clear the soil pores of colloidal matter to some extent, and thus contribute to the result?

Assuming the Goroke results sound, the following table gives the commercial aspect. Wheat has been calculated at 4s. per bushel, superphosphate at £5 10s. a ton, and gypsum 35s. a ton, spread on the land. Gypsum has been recently quoted at Goroke in bulk at less than half that rate:—

Table X.—Showing Extra Profit Per Acre Attributable to the Use of Superphosphate and Superphosphate and Gypsum at Goroke.

Average of Results, 1921-1922.

Treatment per acre.	Increase due to fertilizer.	Value of increase.	Cost of manure and soil amendment.	Extra profit due to the use of manure and amendment.
		s. d.	*s. d.*	*s. d.*
No manure	..	..	..	..
Super., 1 cwt.	8·0	32 0	5 6	26 6
Super., 1 cwt. + gypsum, 30 cwt. ..	18·8	75 2	58 0	17 2
Super., 2 cwt.	13·1	52 5	11 0	41 5

Thus it will be seen that despite the heavily increased yield due to gypsum the cost of the heavy application needed absorbs a good deal of the profit. An application of 2 cwt. superphosphate by itself is the most profitable form and quantity to apply if the effect of gypsum were not reasonably lasting. Experiments are now in progress to determine that all-important point. It is difficult to forecast how long

the effect will endure. If the same rate of improvement can be maintained for five crops the gypsum applications would show a very substantial profit. The profit obtained by the use of 1 cwt. of superphosphate would be increased by 32s. 8d. per crop per acre. If only half that rate were obtained, the extra profit would be 11s. per acre per crop.

There is, roughly, an area 70 miles square, i.e., about three million acres, in Western Victoria, where the soils are in structure similar to those at Goroke. At present it hardly pays to cultivate these, and they are given over to the merino sheep. Gypsum may transform it into profitable wheat country. Then there are large areas of stiff reddish clays in the Wimmera and Goulburn Valley. Gypsum may improve these profitably. In the irrigation settlements much of the soil requires opening up before lucerne will grow satisfactorily. So there is an immense field.

As to the supplies of the material, millions of tons of it occur naturally in the north of Victoria, especially in the Mallee. None of the districts mentioned is more than 450 miles by rail from the furthest north deposit, and many are as close as one hundred miles by rail. The freight on a ton of gypsum for 450 miles is 11s. 8d., which is not prohibitive. Gypsum occurs in circumstances which render it possible to instal bulk handling appliances. This could be done if there were sufficient demand. Even with crude hand methods, quotes as low as 7s. per ton on trucks in bulk have been obtained. Bulk handling would reduce this by half.

Summary.

Physical properties of soils are as important as the chemical one. In Victoria, as elsewhere, the principal defects are those of texture and of structure. There are a number of well-known remedies for most physical defects. These include slow-acting remedies, such as rotation systems, providing for humus additions; and quick-acting ones, such as under-drainage, and the use of soil amendments, such as lime and gypsum. For defects of structure there are subsoiling, blasting, etc. Most of these remedies are costly, though their use could be extended. There is need for a cheap method of opening up structurally defective soils, such as those where there is hard-pan or impervious clay subsoil.

Results of experiments on soils subject to water-logging in winter at Goroke show that gypsum increased the yield 69 per cent., and at Cavendish 160 per cent. Elsewhere the increases were not above 20 per cent., on soils which do not water-log. Investigations made on samples taken with a soil augur from the treated and the untreated field show that the "colloids" with clay subsoil were substantially reduced. In one layer the reduction was equal to 40 per cent. of the colloids present. The reduction is evidently due to flocculation and precipitation of the colloids in suspension. From this it is inferred that the pore space of the soil is freed of gelatinous clay substances, and hence permeability to water and other properties are improved. There are large supplies of gypsum available in the north of Victoria. If the gypsum will remain active in that soil for a few years, a substantial profit will result from its use, even at present prices, which could be reduced substantially if the demand increases.

The experiments are incomplete, and further investigations are pending.

COMPOUNDING RATIONS.

W. A. N. Robertson, B.V.Sc., Chief Veterinary Inspector.

In order to simplify the compounding of rations for the dairy cow, which should vary within certain limits according to the size of the animal and the amount and test of the milk she yields, the graphic method on page 599 has been compiled by Mr. M. J. G. Colyer, B.E. (Sydney), Assoc. M. Inst., C.E., from an article by the writer in *Australian Farming.*

For those not familiar with the graphic method, the following explanation is given:—The maintenance ration of fat, protein, and carbohydrate for animals of various weights is shown by the lines running across the chart to O.O.F., O.O.P., and O.O.C.H. on the right hand.

For a cow in milk, additions must be made according to the quantity and test of the milk. All quantities and tests cannot be shown, but an approximate figure may be found in the following manner:—

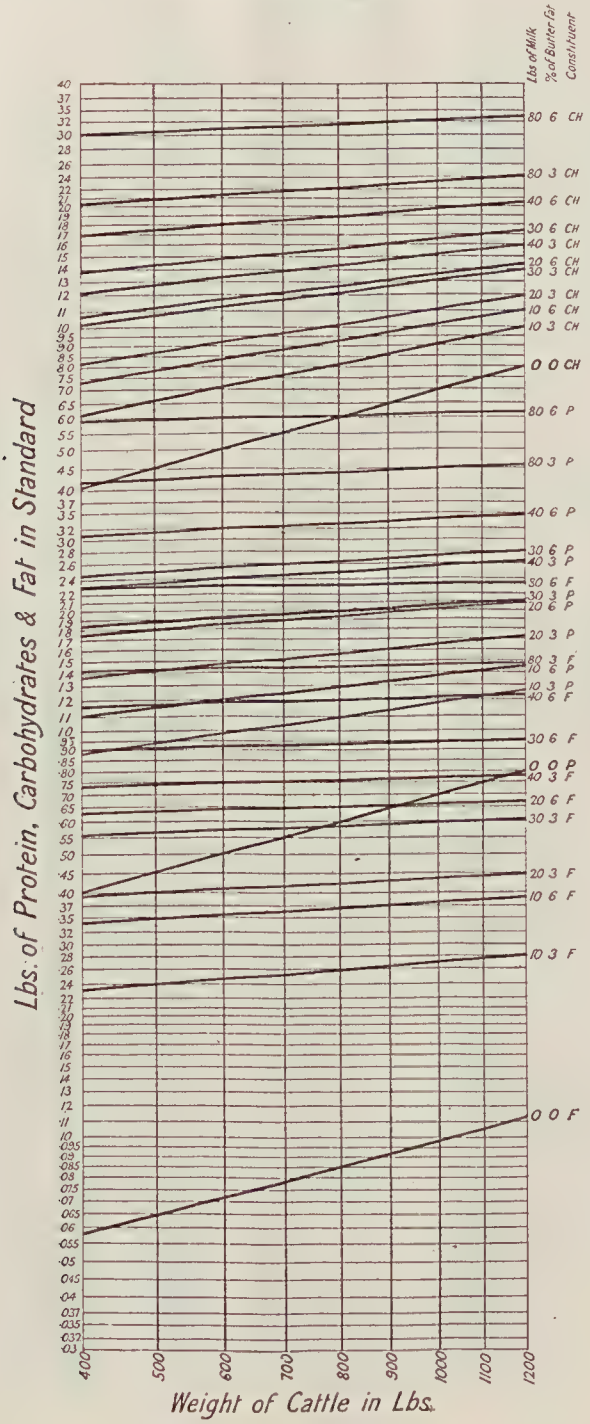
Suppose one wishes to ascertain what ration should be given to a 900-lb. cow giving 30 lbs. of 5 per cent. milk. Figures are shown on the chart for animals giving respectively 30 lbs. of milk of 3 per cent. fat, and 30 lbs. of 6 per cent. fat. It will be readily seen that the indicator in the case of a cow giving 30 lbs. of milk of 5 per cent. fat will fall in its relative position between the two other numbers, *i.e.*, approximately one-third of the way below 30.6 F. and two-thirds of the way above 30.3 F. on the perpendicular line, indicating 900 lbs. weight. Thus the result appearing on the left margin will be .80.

Protein is found by taking 30.3 P. on the right hand, and moving two-thirds of the distance towards 30.6 P. The cross line intersecting the 900-lb. perpendicular line will thus run towards the figure 2.4 on the right hand, which indicates the required amount of protein. By the same system the carbohydrate necessary is found to be 15.0. How these amounts may be supplied is then determined from the table of food constituents, and the following illustrates the result:—

lbs.	P.	C.H.	F.
30 Maize silage ...	0.54	4.05	0.18
15 Chaff (oaten) ...	0.67	6.55	0.22
10 Bran	1.10	4.20	0.25
1 C. oil cake ...	0.16	0.42	0.09
	2.47	15.22	0.74
Standard from graph ...	2.4	15	0.80

A ration for any quantity and quality of milk may be determined in similar manner from the remainder of the tables, and its actual cost ascertained, while from the formulæ of Comparative Value of Foods, any ingredients may be compared to ascertain the cheapest.

FOOD MIXING CHART.



Compiled from papers by W. A. N. Robertson, B.V.Sc., and from other sources by M J. G. Colyer, B.E. (Sydney), Assoc. M. Inst., C.E.

Green Fodder.

	Dry Matter.	Protein.	Carbo-hydrates.	Fat.	Nutritive Ratio.	Food Units.
	%	%	%	%	/:	
Barley	21·0	1·9	10·2	0·4	5·8	15·9
Clover—Red	29·2	2·9	14·8	0·7	5·6	23·8
Cocksfoot Grass	27·0	1·5	11·4	0·5	8·4	16·4
Cow Pea	16·4	1·8	18·7	0·2	5·1	23·7
Horse Bean	15·8	2·2	7·1	0·2	3·4	13·1
Kentucky Blue Grass	35·0	3·0	19·8	0·8	7·2	29·3
Lucerne	20·0	3·7	7·3	0·6	2·3	18·0
Maize	20·7	1·0	11·6	0·4	12·6	15·1
Oats	37·8	2·6	18·9	1·0	8·2	27·9
Pasture Grass Mixed	20·0	2·5	10·2	0·5	4·5	17·7
Rye	23·4	2·1	14·1	0·4	7·1	20·3
Saltbush	23·5	2·5	9·2	0·3	3·9	16·2
Sorghum	20·6	0·6	12·2	0·4	22·0	14·7
Soya Bean	24·9	3·2	11·0	0·5	3·8	20·2
Vetch	19·9	3·9	7·3	0·5	2·2	18·3

Silage.

Barley	26·0	1·8	12·7	0·9	8·3	19·4
Clover	28·0	2·0	13·6	1·0	8·0	21·1
Cocksfoot Grass	23·0	1·1	10·6	1·0	11·9	15·8
Maize	24·6	1·8	13·5	0·6	8·3	19·5
Oaten	28·0	·5	14·8	0·9	11·3	21·8

Roots, etc.

Apples	19·2	0·7	16·6	0·4	25·1	19·3
Beet—Pulp	10·2	0·6	7·3	0·4	12·1	9·8
Cabbage	15·3	1·8	8·2	—	5·1	12·7
Carrots	11·4	0·8	7·8	0·4	10·4	10·8
Mangolds	9·1	1·1	5·4	0·2	5·1	8·6
Parsnips	11·7	1·6	11·2	0·1	7·3	15·4
Pie Melon	7·15	0·7	3·5	0·2	7·1	5·7
Potatoes	21·1	0·9	16·3	0·6	18·4	20·0
Pumpkins	9·1	1·0	5·8	0·1	6·5	8·6
Rape	14·0	1·5	8·1	0·3	5·7	12·6
Turnips	9·5	1·0	7·2	0·2	7·7	10·2
Beet—Leaves	12·0	1·7	4·6	0·2	3·2	9·3

Hay.

Barley	91·5	5·8	43·1	1·6	8·1	61·6
Clover—Red	84·7	6·8	35·8	1·7	5·8	57·0
Cow Pea	89·3	10·8	38·6	1·1	3·8	68·3
Grass—Mixed	87·1	5·9	40·9	1·2	7·3	58·6
Lucerne	89·1	12·3	37·1	1·6	3·3	71·8
Oaten	89·9	4·5	43·7	1·5	10·5	58·7
Rye Grass	86·0	6·1	37·8	1·2	6·6	56·0
Vetch	88·7	12·9	37·5	1·4	3·1	73·2
Wheat	91·2	3·6	46·1	1·1	13·5	57·8

Straw.

Barley	85·8	0·7	41·2	0·6	61·0	44·4
Corn Stover	59·5	1·4	31·7	0·7	23·8	36·9
Oaten	90·8	1·2	38·6	0·8	33·8	43·6
Oat Hulls	90·6	1·71	48·3	0·7	29·3	54·3
Pea	86·4	4·3	32·3	0·8	7·9	45·0
Soya Bean	89·6	2·3	40·0	1·1	18·5	48·5
Wheat	90·4	0·4	36·3	0·4	93·2	38·3
Wheat Chaff	85·7	0·3	23·3	0·5	81·8	25·3

Grain and Seeds.

	Dry Matter.	Protein.	Carbo-hydrates.	Fat.	Nutritive Ratio.	Food Units.
	%	%	%	%	/:	
Barley	90·0	9·6	63·5	2·1	7·1	92·7
Cow Pea	85·2	18·3	54·2	1·1	3·1	103·0
Linseed	90·0	19·4	18·0	34·7	5·4	153·0
Maize	89·4	7·8	66·7	4·3	9·9	96·9
Oats	89·0	9·2	47·3	4·2	6·2	80·8
Peas	89·5	16·8	51·8	0·7	3·2	95·5
Rice	87·7	5·3	67·6	0·3	12·8	81·6
Soya Bean	89·2	29·6	22·3	14·4	1·9	132·0
Sunflower	92·5	12·1	20·8	29·0	7·7	123·0
Wheat—Old	91·7	13·7	47·6	1·4	3·7	85·3
„ Average	89·5	10·2	69·2	1·7	7·2	98·9

Products.

Brewers' Grains—Wet	24·3	3·9	9·3	1·4	3·2	22·5
Cocoanut Oil Cake	85·9	16·4	42·2	9·1	3·9	106·0
Dried Blood	91·5	52·3	—	2·5	—	137·0
Linseed Meal	89·1	26·1	38·5	6·5	2·0	120·0
Maize Meal	88·0	8·4	66·3	3·4	11·6	96·0
Maize Oil Meal	—	18·7	27·1	20·9	3·2	126·0
Malt Combing	94·7	26·1	50·6	1·5	2·0	120·0
Molasses	—	—	62·0	—	—	62·0
Mollerne (Lucerne and Molasses)	80·0	11·3	47·0	2·2	4·8	82·0
Oat Branning	95·4	14·9	51·8	7·9	4·8	109·0
Pea Meal	89·5	16·8	51·8	0·7	3·2	95·0
Peanut Meal	89·5	49·9	22·8	6·9	0·8	165·0
Polly Feed	89·0	14·0	52·0	2·0	4·0	92·0
Wheat Bran	88·3	11·2	42·2	2·5	4·3	76·0
Pollard	88·3	12·2	53·4	3·8	5·1	93·0
Milk	12·8	3·6	4·9	3·7	3·6	23·0
Skim Milk	9·4	2·9	5·2	0·3	2·0	14·0
Buttermilk	9·9	3·9	4·0	1·1	1·7	16·0
Whey	6·6	0·8	4·7	0·3	6·0	7·0

Comparative Value of Foods.

$2 \cdot 5\,(P. + F.) + C.H. =$ Food Units $=$ F.U. in long ton.

$$\frac{\text{Price of long ton}}{\text{F.U.}} = \text{Price of Food Unit for comparison.}$$

Nutritive Ratio $=$ N.R.

$$N.R. = \frac{C.H. + 2 \cdot 5\,F.}{P.}$$

Approximate Starch Equivalent.

$P. + C.H. + 2 \cdot 2\,F. =$ S.E. in 100 lbs. of the food.

	Lbs. per Bushel.
Barley	50
Beans	60
Linseed	56
Maize	56
Oats	40
Peas	60
Wheat	60
Pollard	20
Bran	20

Price per 2,240 lbs.	= Pence per lb.	Price per 2,240 lbs.	= Pence per lb.	Price per 2,000 lbs.	= Pence per lb.
£ s.		£ s.		£ s.	
2 0	0·2143	5 0	0·5357	1 0	0·12
2 5	0·2410	5 5	0·5625	4 0	0·48
2 10	0·2678	5 10	0·5892	4 5	0·51
2 15	0·2946	5 15	0·6160	4 10	0·54
3 0	0·3214	6 0	0·6428	4 15	0·57
3 5	0·3482	6 5	0·6696	5 0	0·60
3 10	0·3750	6 10	0·6964	5 5	0·63
3 15	0·4018	6 15	0·7232	5 10	0·66
4 0	0·4286	7 0	0·7500	5 15	0·69
4 5	0·4553	7 5	0·7768	6 0	0·72
4 10	0·4821	7 10	0·8036	6 5	0·75
4 15	0·5089	7 15	0·8303	6 10	0·78
		8 0	0·8571		

1s. per ton = 0·00536 pence per lb. 5s. per ton = 0·03 pence per lb.
1s. per ton = 0·006 „ „

POULTRY NOTES FROM STATE RESEARCH FARM, WERRIBEE.

By W. O. Pederick, Poultry Foreman.

Hatching operations for this season have now been completed. About 2,500 chickens have been hatched. Five hundred of the earliest of these are now on free range in colony houses, and in spite of the rough weather are doing exceptionally well.

Cockerels are always separated from the pullets as soon as possible; this gives the pullets a better chance to develop.

Leghorn cockerels hatched in July will be ready for the Cup market. Such birds, if well fed, are usually marketable when fourteen or sixteen weeks old.

All male birds should now be removed from the breeding pens. If this be done, the hens will lay better, and, further, infertile eggs keep better either in preservative or in cool storage.

A sharp look-out must be kept for vermin, and perches and nests should be examined frequently for red mites. If any are found, the wood-work should be painted with kerosene. It is also very necessary that dust baths should be available for all birds.

At this time of year hens of heavy breed are inclined to go broody. Any broody hens should be placed in a wire-netting cage suspended from the roof. If this be done in the early stages, the broodiness will be easily broken-off; from twenty-four to forty-eight hours in the cage is usually sufficient.

PASSION FRUIT CULTURE IN VICTORIA.

(Continued from page 488.)

By J. Farrell, Orchard Supervisor.

XV.—Sterility and Kindred Defects.

Provided the growing conditions be favorable, the black passion produces a great number of early blossoms, and a relatively high percentage of these set fruit; but, when those conditions are not satisfactory, the crop matured is often light.

Sterility may become apparent in either of two forms. A number of blossoms may grow to about one-third full size, then, without opening, lose their vitality, turn yellow, and drop from their cups; in other cases some blooms may attain full size, open naturally and be apparently fertilized, but soon afterwards wither and fall from the flower cups. Cups from which immature flowers have fallen are illustrated in Fig. 29; three of those may be seen at different nodes on the lateral between the matured fruits and the terminal bud, and at the fourth node from the base of leader (B), in Fig. 25, an empty cup, from which a fully matured and apparently fertilized flower has fallen, is visible. Either or both forms of sterility may be noticed in leaders or laterals, but these mostly occur in the order as shown. These objectionable forms are less pronounced, however, in localities where ideal climatic conditions prevail. Some plants are greater offenders in this regard than others; therefore, when selecting seed from which to propagate young vines, growers should give this matter careful attention, and collect seed from the most precocious and prolific bearers only.

Either form of barrenness mentioned may occur at any time during the flowering period; but as a rule the dropping of the apparently-fertilized flowers happens early in the fruit season, while the immature blossoms usually fall in mid-season, or just prior to the setting of the late crop. The losses sustained through these forms of sterility are sometimes serious, but they may be reduced to a minimum by careful seed selection, good cultivation, manuring, and heavy pruning.

As passion fruit is grown for its pulp, planters should endeavour to prevent any form of barrenness likely to militate against the production of the highest number of fruits per vine, or the yield of fruit not containing a full quantity of pulp.

There is another defect, which may be regarded as akin to the two forms of barrenness already described, sometimes found in passion fruit. This irregularity may exist in fruits of outwardly apparent normal growth, but which, when cut open, show that some or all of the seeds are neither developed nor enclosed in the usual natural pulpy covering. This form of barrenness is illustrated in Fig. 31, which shows the two transverse sections of one fruit to the left, and the longitudinal sections of another appear to the right in the picture. To thoroughly realize this objectionable condition, the reader should compare the sections under notice with the corresponding sections of the well-filled fruits shown in Fig. 2 in this *Journal* for December, 1922. There are rarely any external indications of the "empty" condition of such fruits, but as they are light compared with the "full" fruits, practical pickers and packers quickly detect and reject such "duds."

A properly developed, ripe fruit contains three elongated clusters of seeds running from end to end of same. There are 50 seeds in each cluster, or 150 altogether, each seed being covered with pulp and enclosed in a fine film or skin. The seeds are borne on short, stout fibres or threads which project inwards from the capsule or shell, the clusters describing a triangle, as shown in the cross-sections in Fig. 31.

The pistil of the flower being in three divisions, it is obvious that these correspond with and are the responsible media through which their respective clusters of seeds are fertilized. These defective fruits usually grow to full size, some ripen a few seeds, but a high percentage are like those illustrated, in which not a single seed had matured. This class of fruit rarely appears on the Common Black passion until

Fig. 31.—Transverse and Longitudinal Sections of Two Full-grown *P. edulis* Fruits Without Matured Seeds or Pulp.

late in the fruit season when the weather becomes cold, and when the vines feel the effects of previous heavy cropping.

The last remark does not apply in the case of the Mammoth, however, as it is a more regular offender in this regard, producing many empty or partly empty fruits during the whole season. The two Mammoth fruits cut into sections to correspond with the Common Black specimens appear in Fig. 32. Here only three seeds matured in the fruit cut into cross-sections, but not a single seed developed in the one cut longitudinally. Some vines yield more of these worthless fruits than others; and the five-year-old plant from which the two fruits illustrated were picked never yielded a perfect specimen. Here again we have an indication of the need for careful seed selection.

A grower determining on raising vines from the seeds of such fruits as these would certainly be wooing failure. There is no occasion for planters and others interested to become alarmed at this irregularity appearing in the Common Black passion, because this condition may be reduced to a minimum, if not absolutely eliminated, from this variety by practising the methods of seed selection, cultivation, pruning, &c., previously advocated. But in the Mammoth the different forms of barrenness (apart from shy bearing), and particularly the one under consideration, are more extensive and serious in their effect because of the apparent inherent tendency of this sub-variety to produce these worthless fruits. Nevertheless, there is evidence that further acclimatization may prove a helpful factor in encouraging productivity.

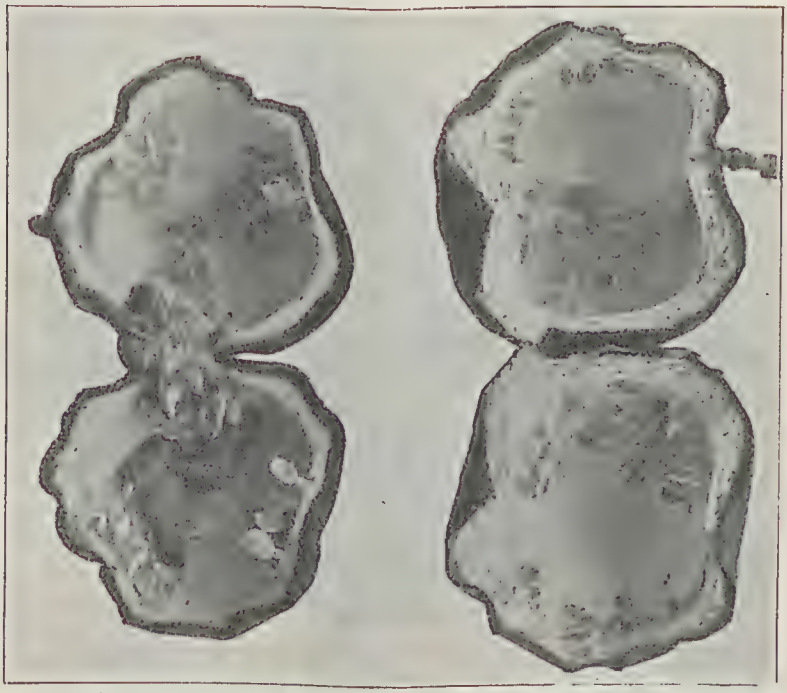


Fig. 32.—Transverse and Longitudinal Sections of Two Fully-grown Mammoth Fruits Showing only Three Matured Seeds and Their Pulp.

XVI.—Insect Pests and Fungous Diseases, and their Treatment; Experimental Spraying, and Woodiness.

Like other vines and fruit trees, the passion has its insect and fungous enemies. Because of the failure to fully employ the recognised methods of preventive and remedial treatment against these in the past, many growers have sustained rather serious losses. Having realized the approximate amount of these losses, however, in fruit as well as that suffered through injury done to the vines, and because of the recently revived interest and enthusiasm in the cultivation of passion vines, most growers are intent on dealing with these pests and diseases in the most vigorous manner in future.

The vines suffer considerably more through the development of fungous organisms than they do from insects. Occasionally, the stems and roots are attacked by the white ant (*Termes Australis*). These rarely infest young vigorous vines, but confine their attention mostly to old and decaying ones, and to those affected with Collar Rot. Vines from the stems of which the bark has been removed through the careless use of cultivating implements are also liable to suffer from this trouble. When the bark is broken, the wood quickly dries, and thus the ants may obtain an entrance. Having gained admission, they commence tunnelling through the stem and soon destroy it.

The preventive measures against this attack consist of keeping the soil around the vines well cultivated, and in regularly examining the stems to see that their bark is intact and healthy. When a vine is

Fig. 33.—Leaf of the Common Black Passion Affected with Brown Spot.

found to be infested, the best treatment is to inject kerosene, crude petroleum, or red oil emulsion into the affected parts, taking care that the emulsion penetrates every section of the tunnellings. Seriously damaged plants should be grubbed out and burned, and the soil treated to a heavy dressing of lime before replanting.

Leaf eaters and aphis pests rarely attack the passion, but scale insects sometimes infest the vines, mostly attacking the leader growths, the greatest offenders being Brown Scale (*Lecanium Oleae*) and the Greater Vine Scale (*L. Berberidis*). These pests, however, may easily be kept in check, if not absolutely eradicated, by the use of red oil emulsion (1 in 35) or crude petroleum (1 in 25) applied as a spray in late winter.

Fungous Diseases.

Of the fungous diseases which attack the passion vine Brown Spot of the leaf and fruit (*Glœosporium sp.*) may be regarded as the most injurious, as it causes by far the most serious losses in fruit, and damages the plants to the greatest extent. As in the case of most fungoid growths, this thrives best under humid atmospheric conditions. When the fruit season is wet, considerable quantities of passions are destroyed; whereas, in dry seasons the losses caused by this disease are hardly noticeable.

Fig. 33 illustrates a leaf of the Common Black passion affected with Brown Spot. The spores or seeds of this disease, which are very minute, finding a lodgment on the moist leaves or fruit, send out spore-tubes or roots; these enter the epidermis or skin through the stomata

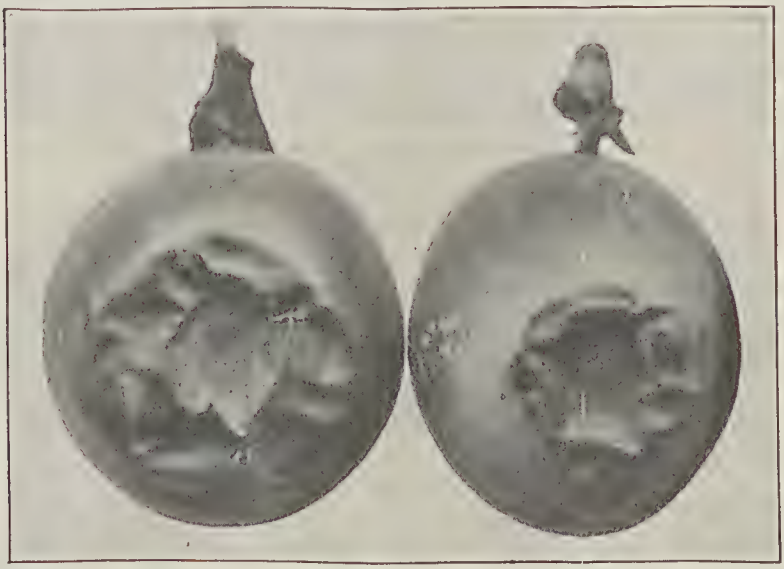


Fig. 34.—Two Ripe Fruits of the Black Passion, showing Effect of Brown Rot.

or breathing pores therein. The diseased spot is at first relatively small and pink, but, as the ramification of the fungus proceeds, a series of fairly well-defined, dark-coloured concentric circles become visible, indicating the lateral, radiant expansion of the mycelium or root system. Later, the centres of spots on leaves become almost white, whereas those on fruit turn black. To fully realize this, compare the spots on the leaf under notice with those on the two ripe fruits illustrated in Fig. 34. Not alone does this fungus live at the expense of its host, but, after having reached a certain forward stage of development, it seems to emit a fluid which is apparently poisonous to the host. This condition is more noticeable in the leaves, for these become very sickly, quickly turn yellow, and drop off when serious infection occurs. When the functioning of the leaves is interfered with in the manner described, partial defoliation of the vines follows; the fruit ceases to develop, and sometimes a high percentage of the crop is destroyed.

Growers experienced a severe visitation of the fungus in 1922, when relatively large quantities of fruit were destroyed. This followed a heavy fall of rain about the second week in February, when the vines were carrying a splendid crop of nearly-matured fruit, just prior to the time of ripening. In the absence of rains of any consequence, however, there was practically no appearance of the fungus during the 1923 fruit season. The leaves or fruit may be attacked at any time during their growth, and when climatic conditions specially favour the fungus, the bark may also become affected; and there is practically no limit to the number of spores that may find ingress to the different parts of the vine and its fruit.

The stems are sometimes attacked by Collar Rot (*Sclerotinia sp.*), which causes portions of the bark at the ground level to rot and peel off, often killing the vine, and always rendering the wood liable to become infested with white ants. The Root Fungus (*Armillaria mellea*) has also to be guarded against; this, after going through the different stages of growth, destroys the bark on the roots, and when its work of destruction is completed, the fructification of the fungus appears at the collar in the form of toad-stools. Other fungi are also found on the vines, but those mentioned cause most of the damage of serious consequence.

Treatment—Preventive and Remedial.

These, being fungous organisms, are amenable to treatment by the recognised fungicides, and the sprays mostly used in combating them are Bordeaux Mixture and Lime-sulphur. In dealing with the diseases mentioned the preventive and remedial measures advocated for use against them respectively will be given in this order.

The preventive measures employed to mimimize the chances of infection by Brown Spot consist of regularly collecting all badly-diseased fruits and boiling or burning same, and all prunings and diseased leaves should also be burned as pruning proceeds, and at other times when necessary. Good cultivation, manuring, &c., keeps the vines growing vigorously; this is always a helpful factor, and proper pruning to maintain young wood, and admit light and air to all parts of the plant's superstructure, is also recommended. Applying the sprays mentioned above mostly constitutes the remedial treatment for this disease, and Lime-sulphur has, so far, given the best results. The first spray may be applied at the rate of 1 gallon lime-sulphur to 30 gallons water about the middle of November, when the young shoots on the pruned vines have grown a few inches long. The importance of also spraying, but with a weaker mixture (1 in 40 or 50), immediately after heavy rains occurring later during the fruit season cannot be too forcibly emphasized, because it is after those rains that the greatest quantities of fruit are destroyed. The spray kills the spores germinating on the leaves and fruit, and the deposit acts as a deterrent to others seeking an entry later. When Bordeaux Mixture is employed the 6-4-50 and 6-4-70 formulæ may be used respectively at the times recommended for the Lime-sulphur applications.

The attack of Collar Rot may be prevented by occasionally removing the soil, and particularly in early spring, from around the collar to a depth of about six inches, in this way allowing the sun to have full

play on the bark for ten or twelve days. When the bark is thus made firm, dry and healthy, and enabled to resist the fungous spores, the soil may be returned to its original position. If, on examination, any of the bark at the collar is found to be diseased, the remedy is to scrape out the affected parts and spray these with strong Lime-sulphur, or Bordeaux Mixture, or paint the parts with Bordeaux Paste.

The Root Fungus being indigenous, is prevalent in many districts, and infects native trees and shrubs. When grubbing a plot where this fungus is known to exist, the roots should be removed to a depth of at least eighteen inches, and the land should be cropped and worked for a year or two, so as to eradicate the fungus prior to planting the vines. As this disease operates underground, the method just suggested may be regarded as the only means that can be employed to prevent its infecting the passion plants.

If the disease be found to exist among passion vines, the remedy is to regularly remove the soil from the main roots of sickly vines, and if the presence of the disease be discovered, the roots should be sprayed with Bordeaux Mixture, 6-4-40, and the earth replaced.

Experimental Spraying.

The damage caused by Brown Spot in passions was only trifling prior to 1909, but in that year the losses as a result of its visitation were fairly severe. On account of this, the Department of Agriculture conducted spraying experiments in Mr. J. Hogg's garden, at Wandin, during the 1910 fruit season, Bordeaux Mixture, 6-4-50 and 6-4-70, being used. Two rows of vines were operated on. They were heavily pruned, and allowed to produce young shoots a few inches long before being sprayed in November. When the sprayed plants were examined in January, there was little or no spot to be found on them, and no damage was done to the foliage by either strength of mixture, both of which gave equal results. The unpruned and unsprayed vines in the same plot were at this time infected with spot.

Owing to the viperous virulence of the Glœosporium attack in 1922, and to satisfy the passion-growers' request, the Department arranged to carry out experiments again during 1923, to further test the relative efficacy of the different fungicides. Eight rows of vines or 72 plants of different ages were treated. These experiments were conducted in the gardens of Messrs. A. V. Strong and E. Mattingley, at Silvan; particulars of same are as follows:—

Mr. A. V. Strong's Plot.

Number of Row.	Number of Vines.	Treated.	Material.	Formula.	Result.
1 ..	10 ..	16.11.22	Lime Sulphur	1 in 30 ..	No spots visible
2 ..	10 ..	„	„	1 in 35 ..	Slightly spotted
3 ..	10 ..	„	Bordeaux	6–4–50 ..	Slightly spotted
4 ..	10 ..	„	„	6–4–70 ..	More spotted than Nos. 2 and 3

Mr. E. Mattingley's Plot.

Number of Row.	Number of Vines.	Treated.	Material.	Formula.	Result.
1 ..	8 ..	17.11.22	Copper Soda	6–8–50 ..	Fairly effective
2 ..	8 ..	„	„	6–8–70 ..	Not as good as No. 1
3 ..	8 ..	„	Atomic Sulphur	1 lb. to 10 gls. water	No effect on spotting
4 ..	8 ..	„	„	1 lb. dusted on	No effect on spotting

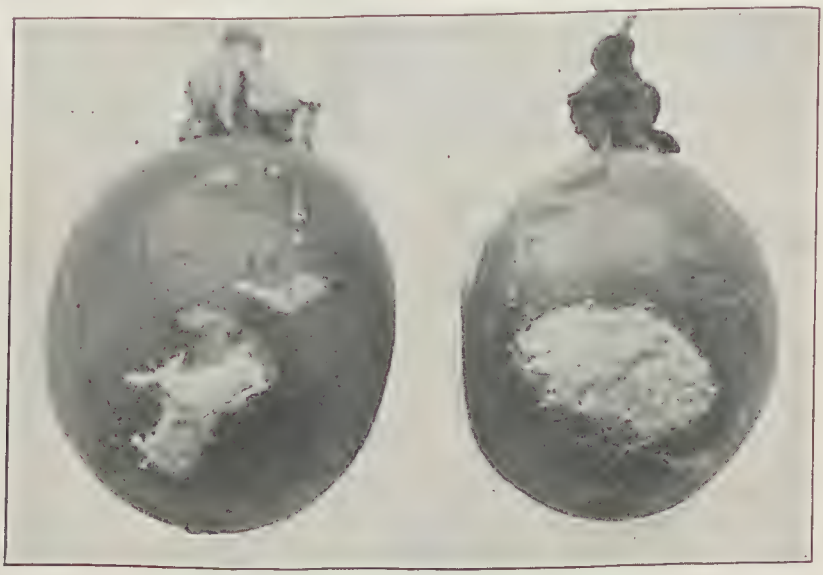


Fig. 35.—Two Ripe Fruits Affected by Woodiness.

Each plot consisted of consecutive rows, and the spraying and dusting were carefully done, the leaves and wood being covered. The treated vines were inspected on 15th February, 1923, and the results as given in the table noted, and a second examination on 9th March revealed no change to warrant any alteration in the order of results as shown. Lime-sulphur, 1 in 30, gave the best result, no spots being visible on the plants treated by this formula. The results from Lime-sulphur, 1 in 35, and Bordeaux Mixture, 6-4-50, were about equal, the leaves being slightly spotted in each case, and evidently Bordeaux, 6-4-70, is rather weak for use at this stage. Copper soda, 6-8-50, was fairly effective, giving a better result than that following the weaker formula of same. The eighth vine sprayed with Atomic Sulphur, as well as an equal number dusted over with this ingredient, were found to be as badly spotted as untreated plants in the garden.

The main objective, when commencing these experiments, was to find the best remedy for combating the February and mid-season attacks

of the fungus after rains occurring at these times. The intention was to spray immediately after these rains with whatever material proved most effective earlier, so that the liquid might kill the germinating spores and leave a residue to destroy those finding a lodgment later. The object was frustrated, however, by the absence of rains, which although favoring the growers, may, from the experimentalist's point of view, be regarded as rather unfortunate. The trials will be resumed during the 1924 fruit season.

Woodiness.

This peculiar development, the direct cause of which is unknown, appears only on the shell of the fruit. It is an abnormal growth on the outside of the capsule and protrudes slightly from the shell's surface; some affected fruits show only slight blemishes, while others may be covered with relatively large irregular patches. These growths are at first soft, and of a light green colour, but get darker as development proceeds, until at the ripening they become coriaceous, hard, and almost white, as illustrated on the two ripe fruits appearing in Fig. 35. Woodiness, although retarding the growth of some specimens, does not seem to impair the quality of the pulp; but these unsightly blemishes detract considerably from the market value of the fruit. This disease, or rather, abnormal condition, although sometimes affecting a low percentage of the fruit on healthy, vigorous vines, is mostly found on that of delicate unpruned ones. Therefore, woodiness need not cause careful growers any alarm, and its absence from the garden is indicative of good cultivation, manuring, and pruning.

(*To be continued.*)

LARGE WHITE PIGS FOR BACON.

Large white pigs have never become popular in Australia, but are highly valued in England for prolificacy and bacon-making qualities. Mr. W. Hallas, of Warrington, England, has reported that a large white sow produced 51 strong, vigorous pigs in eleven months, and reared 40 of them in three litters. She farrowed 15 pigs on 17th December, 1921, and reared 13, two being killed as porkers at 79 days old, and weighed dressed 53 lbs. and 51 lbs. respectively. She farrowed again on 5th June, 1922, 19 pigs, rearing 15 (on 14 teats). Her third litter was farrowed on 10th November, 1922—17 pigs, of which 12 were reared.

PACKING OF FRUIT IN SOUTH AFRICA.

DISPLAY IN MELBOURNE.

By E. Meeking, Senior Fruit Inspector.

A small consignment of soft fruits was in February last shipped to Victoria by the South African house of T. J. Poupart Ltd. to Mr. Edmund W. T. Adams, Victorian representative of Messrs. T. J. Poupart Ltd., Covent Garden, London, Liverpool, Hull, Glasgow, &c.

The fruit was on exhibition for three days at the Produce Offices of the Department of Agriculture. It was not in any way a selection of the choicest fruit available, but was taken from an export consignment intended for shipment to London. It may therefore be regarded as showing the methods usually adopted by exporters in shipping fruit from South Africa to London.

The shipment consisted of fifteen trays of peaches, plums, and pears, made up as follows:—

Peaches.

Size of Boxes—12″ x 18″ x 3″.

Variety.	Grade.	Style of Pack.
1 Case "Schoongezecht"	Selected	3 x 4 21 peaches to tray.
2 Cases "	"Choice"	4 24 " "
2 " "	"	4 28 " "

Plums.

Size of Boxes—12″ x 18″ x 2½″.

Variety.	Grade.	Style of Pack.
2 Cases "Apple Plum"	Selected	5 x 5 45 plums to tray
3 " " "	"Choice"	6 x 5 55 " "

Pears.

Size of Boxes—12″ x 18″ x 3″.

Variety.	Grade.	Style of Pack.
2 Cases "Bon Chretien"	Selected	4 x 3 25 to tray
3 " " "	"	

Packing.

Each fruit (peaches, plums, and pears) was separately wrapped in absorbent tissue paper, which bore the grower's brand and the locality in which the fruit was grown (as per illustration, No. 1). The wrapper was placed around the fruit in such a manner as to show the brand on the top of the fruit, so that when the boxes were opened, the brand was prominently displayed.

The method of packing is well shown in illustration No. 2. A "nest" of wood-wool was provided by lining the bottom of the boxes with a fairly thick layer; and the peaches were separately "nested", so that each individual fruit was insulated from its neighbour by a thin surrounding layer of wood-wool. The plums and pears were packed with the fruits adjoining each other, and all fruits, whether peaches, pears, or plums, were provided with a layer of wood-wool on the top,

that is, between the lid of the tray and the fruit. The wood-wool was of very fine texture, white, and more finely cut than that at present generally used by the trade in Australia. It resembled in texture and quality the material used by many of our exporters before the war, and known in the trade as " aspen " wood-wool.

Boxes.

These (Illustration No. 3) consisted of trays, constructed of white pine wood, imported into South Africa from Sweden, and were fastened on top by strips or cleats of wood $\frac{3}{8}$ inch wide and $\frac{1}{2}$ inch deep. The nails to hold these also sufficed to hold the tops of the trays to the ends. The lids were not fastened to the trays along their side edges, and the sides of the trays were shallower in depth than the ends, with the lids and bottoms not quite wide enough to cover the end pieces. This construction allowed a small space around the edges of the tray and in the middle of both top and bottom, and provided ventilation between the top edge of the tray and the whole length of the lid. This method, in addition to the before-mentioned cleats, ensured a good circulation of air to the fruit during transit.

Fig. 1.—Paper Wrapper used in South Africa.

The following statement, showing the measurements of the timber from which the trays were constructed, will serve as a guide to those Victorian growers who wish to adopt cases of a similar type for shipping soft fruits:—

Tops and bottoms—Two boards each: $5\frac{3}{8}$ inches wide x 18 inches long x 3-16th inches thick.

Sides—One board each: $3\frac{1}{2}$ inches wide x 18 inches long x 3-16th inches thick.

Ends—One board each: $3\frac{3}{4}$ inches deep x $11\frac{1}{2}$ inches wide x $\frac{3}{8}$ inches thick.

The plum trays were one-half inch less in depth.

Cleats—$\frac{1}{2}$ inch thick x $11\frac{1}{2}$ inches long x $\frac{3}{8}$ inches wide.

It may be mentioned that these trays are of the same sizes and constructed in the same manner as trays in use in the United States for the marketing of soft fruits. The cleats particularly are intended to act as a buffer to protect the fruit when several trays are stacked for

Fig. 2.—Consignment of Fruit Shipped from South Africa to Victoria in February last.

transport or storage. They also further facilitate the free circulation of air in ship's cool chamber.

Branding.

The trays were each branded at one end with a neat white label, covering the whole end of the tray, and bore the following information: Number of pieces of fruit; description; shipper's brand; name of the grower and packer; and Government Fruit Inspector's stamp. These details are shown in illustration No. 3. The consignee's brand or shipping mark was stencilled at the other end of the tray.

SPECIAL POINTS OF INTEREST.

The fruit was picked about the beginning of January, 1923, and was shipped per s.s. *Diogenes*, which arrived in Melbourne on 15th February. All orchards in Cape Colony are within a radius of 120

Fig. 3.—Fruit Tray used by South African Fruit-growers.

miles from Cape Town. The pears were grown by Louis Sarenbeck, at Verebest, Ceres, Cape Province, which is about 95 miles from Cape Town; while the plums and peaches were grown by Arthur Bostock, at Langereest Farm, Simondium, Cape Province, about 35 miles from shipping port.

From the orchards in Cape Colony fruit is railed to Cape Town, where, as required by the South African Government regulations, it must be pre-cooled in cold store for at least forty-eight hours prior to shipment. No other special treatment is given beyond careful picking, packing, and handling. Insulated trucks are not generally used to transport fruit to sea-board. The time which elapses between the picking of the fruit and shipment varies according to circumstances. Sometimes the period is only five or six days, sometimes it is held in cool stores at docks for two or three weeks if shipping space is not available. The fruit is picked in the morning, after the dew has gone off, up to 10 or 11 o'clock. It is placed in a cool shed or shaded place and packed in the late afternoon. The more careful growers make their pickers and packers wear gloves to avoid nail scratching or puncturing of fruit.

The fruit is picked into carrying trays in the orchard, and then carried to the packing-house, where it is sorted into the various grades.

The fruit is supposed to be carried during the sea voyage at a temperature of from 34° to 36° Fahr. No distinction in this respect is made between the different varieties of fruit.

South African Costs.

The following statement of costs will be of interest to Victorian growers, who will be enabled to make a comparison of these with costs in this State:—

Boxes—2½ inches in depth: £14 15s. per 1,000.
,, 2¾ inches in depth: £15 per 1,000.
,, 3 inches in depth: £15 7s. 6d. per 1,000.

All the boxes are of uniform dimensions—12 inches wide and 18 inches long.

Wood-wool: £15 per ton.

The foregoing prices are c.i.f. Cape Town. About 30 per cent. should be added to cover import duty and landing charges.

The picking is usually done by coloured labour and the packing by white labour, but in some instances orchardists have trained their coloured labourers into expert packers. Coloured labourers get about 4s. per day. A good white packer gets 10s. per day. An expert packer is expected to pack from 150 to 200 boxes (trays) per day.

Rail freights are from 7d. to 1s. per 100 lbs. Ocean freights (per cubic ton of 40 ft.) to England:—Peaches and plums, 65s.; pears, 60s. Peaches are reckoned at 90 boxes, plums 85 boxes, and pears 75 boxes to the ton. These work out per tray as follow:—Peaches, 8.66d.; plums, 9.17d.; and pears, 9.6d.

Packing in Trays Urged.

This method of packing soft fruits for export as attractively as possible in individual trays, instead of in bushel or half-bushel cases, has been advocated by the Victorian Department of Agriculture for the past twelve years. Unfortunately few Victorian growers have not seen fit to follow this advice, having apparently been influenced by the greater initial expense which would be incurred. A great opportunity has consequently been lost to our growers of establishing a profitable export trade in pears and plums, and of being first in the field, as South Africa has built up her present trade inside the period mentioned.

It is even now not too late to share in the trade, and provided the proper methods of selecting, packing, and transporting are strictly observed, soft fruits, such as pears, plums, and possibly peaches, should be successfully exported in large quantities to the United Kingdom.

The prices which would be realized should well repay the extra initial expense which would be incurred by strict attention to necessary details, such as careful selection, picking, and packing of fruit; proper handling and stowage during transport; pre-cooling prior to shipment, and the maintenance of proper temperature and ventilation in ocean transit.

Even with the handicaps of longer sea transit and higher freights as compared with South Africa, there is good reason to believe that

Australian growers could profitably share in supplying the British markets with soft fruits.

By comparison with the fruit in the shipment under notice, Victorian fruit is of better flavour and general quality than the South African. This was particularly noticeable so far as peaches and plums were concerned.

It is to be regretted that our growers do not give justice to their fruit by preparing it for export in the attractive manner which its quality demands.

Conclusion.

Messrs. T. J. Poupart Pty. Ltd. and their resident agent (Mr. E. W. T. Adams) are to be congratulated on their disinterested enterprise in sending this consignment to Australia for the benefit and information of fruit shippers. Much valuable information has also been received from Messrs. T. J. Poupart Ltd. in connexion with the experimental shipment of apricots, peaches, and plums shipped from Victoria per the s.s. *Hobson's Bay* at the beginning of January last; and Mr. W. Ravenhill, a director of the firm, has sent full details as to the methods of packing, &c., which should be adopted when shipping soft fruits. This advice is in accordance with the methods which were carried out in connexion with the shipment sent to Australia from South Africa.

SOUTH AFRICAN FRUIT EXPORT REGULATIONS.

For the information of Victorian growers an extract from the South African regulations governing the export of fruit from that country is printed hereunder. These are interesting in many respects, particularly as showing that the Union has seen fit to enforce standard grading and packing for certain fruits, and to compel the pre-cooling of these prior to shipment.

South Africa has already established a large trade in the export of soft fruits (peaches, pears, and plums); is a formidable rival of Australia in the export of citrus fruits; and, according to reliable statistics regarding the planting of apple trees in Cape Colony during recent years, will shortly be a keen competitor in the export of apples.

Every person who intends to export fruit from the Union to a place outside the limits of the Union, but not declared by Proclamation No. 143 of 1914 to be an exempted place, shall give notice of such intention to the Government Fruit Inspector at Cape Town, Mossel Bay, Port Elizabeth, East London, or Durban (as the case may be).

For each consignment of fruit examined by the the Inspector the exporter shall pay at the rate of one shilling per 40 cubic feet on all boxes going twenty-five or less to the ton, and one shilling and sixpence on all boxes going over twenty-five to the ton. (For deciduous fruit, extra 5s. per 40 cubic feet after 21/12/21).

The following fruits shall be packed in boxes the size of which shall be:—

	Outside Measurement.
(*a*) For pears, peaches, nectarines, apricots, plums, grapes.	10 by 12 inches or 24 by 18 inches, the depth being optional.
Grapes may, however, be shipped in crates which shall be a multiple of the grape box mentioned under (*a*), and Almeria grapes may be shipped in barrels or boxes of other measurements than the above.	

	Outside Measurement.
(*b*) For apples, beginning with 1916 shipments	20 by 11 by 10 inches.
(*c*) For pineapples, Cayenne variety	27 by 16 inches, depth optional,
Giant Kew, Queen variety	27 by 14 inches, depth optional.
The standard orange box may also be used for pineapples.	
(*d*) For citrus fruit:—	
Oranges	26 by 12½ by 12½ inches or 26 by 12½ inches. (Depth optional) for single-layer boxes only.
Naartjes	18 by 12 inches, depth optional, and 24 by 12 by 6 inches for half boxes.

All fruit shall be cleated on the top.

Every box of fruit submitted for inspection shall be clearly marked, on one end thereof, with

(*a*) the registered mark of the exporter (or his name or other means of identification).
(*b*) the variety and the kind of fruit, the grade thereof; and the exact number of fruit contained in the box.
(*c*) in the case of loose-skin or green-skin naartjes, the word "loose-skin" or "green-skin" as the case may be:
(*d*) in the case of grapes, the net weight after allowing 5 per cent. for shrinkage.

Every box of fruit submitted for inspection must be consigned to the Dock Goods Superintendent, Cape Town; the Goods Agent, Mossel Bay; the Port Goods Manager, Port Elizabeth; the Port Goods Superintendent, East London; or the Port Manager, Durban direct, or to him through an agent, and bear on the top of the box the shipping mark of the agent appointed by the exporter to dispose of his fruit oversea.

(*a*) Each apple, pear, peach, nectarine, plum, apricot, citrus fruit, and mango shall be wrapped in or surrounded by tissue or other more or less similar paper.

(*b*) Grapes, except Almeria grapes, shall be wrapped in or surrounded by suitable paper.

All fruit, excluding apples and citrus fruits, may be placed in wood-wool or cork dust (in the case of Almeria grapes only) or other material considered by the Department of Agriculture to be suitable packing.

Artificially colored wood-wool is not recommended.

All fruit shall be in sound condition, fully developed, not too unripe, free from disease, bruises, cuts, or from other blemishes affecting its appearance, and be of the characteristic shape of its variety. At least one inch of stalk shall be kept on the Cayenne pine and one half-inch on the Queen, and the whole crown shall be left on the pine in as perfect conditions as possible.

All fruit in one box shall be of uniform size and of one variety; except fruit consigned to private order, in which latter case the box shall be marked on the end thereof "private order."

(*a*) All fruit other than citrus and pine fruits and other than fruit intended to be shipped in ventilated hold shall forty-eight hours previous to shipment, be in a cold store approved by the Department of Agriculture, and in the case of fruit placed in a private cold store so approved the exporter or his agent shall produce to the Inspector a certificate to that effect signed by a person approved by the said Government for the purpose.

(*b*) Fruit placed in private approved cold storage at the port of shipment will be inspected by the Inspector of such stores, provided that forty-eight hours' notice be given to the Inspector by the exporter or his agent. Fruit so stored shall be conveyed to the harbor in refrigerated trucks.

(*c*) Citrus and pine fruit shall be delivered for inspection not less than twenty-eight hours prior to the sailing of the vessel by which the exporter intends such fruit to be shipped.

The following shall be the grades for the fruits mentioned. Owing to shrinkage it is recommended that, when packing, exporters grade all fruit half an inch larger than the sizes mentioned:—

(*a*) APPLES.

No grades are fixed, but varieties ripening prior to Ribstone and Jonathan, with the exception of Five Crowns, Irish Peach, Tomm Putt, and Colville Aromatic, are not recommended for export.

(*b*) PEARS.

Variety.	Extra Selected (Diameter).	Selected (Diameter).	Graded (Diameter).	Lowest Grade (Diameter).
Bon Chretien	2¾ in.	2½ in.	2¼ in.	Below 2¼ in.
Doyenne de Comice	3 in.	2¾ in.	2½ in.	,, 2½ in.
Louise Bonne	2½ in.	2¾ in.	2 in.	,, 2 in.
Beurre Bosc	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
Winter Nelis	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
Beurre Hardy	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
Glou Morceau	3 in.	2¾ in.	2½ in.	,, 2½ in.
Clapp's Favorite	2 in.	2½ in.	2¼ in.	,, 2¼ in.
D'Angoulême	3½ in.	3 in.	2¾ in.	,, 2¾ in.
Beurre Diel	3½ in.	3 in.	2½ in.	,, 2½ in.
Gansel's Bergamot	3 in.	2½ in.	2¼ in.	,, 2¼ in.
Josephine	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
Beurre Superfine	2½ in.	2½ in.	2¼ in.	,, 2¼ in.
Flemish Beauty	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
Rustenburg	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
Forelle	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
Magnate	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
Clairgeau	3 in.	2¾ in.	2½ in.	,, 2½ in.
Durondeau	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.

(*c*) PEACHES.

Variety.	Extra Selected (Diameter).	Selected (Diameter).	Graded (Diameter).	Lowest Grade (Diameter).
Elberta	2¾ in.	2½ in.	2¼ in.	Below 2¼ in.
Early Rivers	2¾ in.	2½ in.	2¼ in.	,, 2¼ in.
All other varieties	2½ in.	2¼ in.	2 in.	,, 2 in.

All varieties shall, as far as possible, be shipped under their own names, and where not described shall be marked "Cape Freestone Peaches" with the exception that all early ripening varieties of similar appearance—such as Hale's Early, High's Early, Canadian, Brigg's Red May, Waterloo, and Early Alexander—may be classed as "Alexanders."

Boxes containing yellow-fleshed peaches must be marked "Yellow-flesh" on the end of the boxes, under the name of the fruit.

Clingstone varieties and Mamie Ross are not recommended for export, but the receptacle of any exported shall be marked "Graded," and shall not be marked by any other grade term. The word "Clingstone" shall, in addition, be printed on the box below the name of the fruit.

(*d*) NECTARINES.

Variety.	Extra Selected (Diameter).	Selected (Diameter).	Graded (Diameter).	Lowest Grade (Diameter).
All varieties	2¼ in.	2⅛ in.	1⅞ in.	Below 1⅞ in.

Clingstone varieties are not recommended for export.

(*e*) APRICOTS.

Variety.	Extra Selected (Diameter).	Selected (Diameter).	Graded (Diameter).	Lowest Grade (Diameter).
All varieties except Early Cape ..	2¼ in.	2 in.	1⅞ in.	Below 1⅞ in.
Early Cape varieties	2 in.	1⅞ in.	1¾ in.	„ 1½ in.

All varieties shall, as far as possible, be shipped under their own names and, where not described, shall be marked "Cape Apricots."

(*f*) PLUMS (Japanese).

Variety.	Extra Selected (Diameter).	Selected (Diameter).	Graded (Diameter).	Lowest Grade (Diameter).
Satsuma	2¼ in.	2 in.	1¾ in.	Below 1¾ in.
Kelsey	2¼ in.	2¼ in.	2 in.	„ 2 in.
Wickson	2⅜ in.	2¼ in.	1⅞ in.	„ 1⅞ in.
Apple	2¼ in.	2 in.	1¾ in.	„ 1¾ in.
Sultan	2¼ in.	2 in.	1¾ in.	„ 1¾ in.
Simoni	2½ in.	2⅛ in.	1⅞ in.	„ 1⅞ in.
Chalco	2¼ in.	2 in.	1⅞ in.	„ 1⅞ in.
Burbank	Nil	2⅛ in.	Nil	„ 2⅛ in.
All other varieties	2¼ in.	2 in.	1¾ in.	„ 1¾ in.

Of the Sultan variety, only the first crop is recommended for export.

PLUMS (Varieties other than Japanese).

Variety.	Extra Selected (Diameter).	Selected (Diameter).	Graded (Diameter).	Lowest Grade (Diameter).
All varieties	2 in.	1½ in.	1¼ in.	Below 1¼ in.

(*g*) CITRUS FRUITS.

Oranges shall be packed so as to contain in the box of 26 by 12½ by 12½ inches (outside measurements) standard packs of 80, 96, 112, 126, 150, 176, 200, 216, 226, 252 oranges, as the case may be, or such additional standard packs as may be prescribed by notice in the *Gazette*.

NAARTJES.

GRADES.

Extra Selected.	Selected.	Graded.
Not less than 2½ in. in diameter.	Not less than 1½ in. in diameter.	Less than 1½ in. in diameter.

The receptacles of "loose-skin" and "green-skin" naartjes shall be marked "Graded," and shall not be marked by any other grade term.

In addition to the foregoing classes of fruit, grade standards are also provided in the regulations for grapes, pineapples, melons and mangoes.

Boards of Reference are established, to which an exporter may appeal if the Inspector refuse to brand or stamp any box of fruit belonging to such exporter.

A fee of ten shillings shall be deposited by the consignor with the Inspector in respect of each consignment of fruit which the consignor may require the Inspector to obtain the decision of the Board of Reference upon, under the provisions of section five of the Act.

Boxes of fruit marked so as to represent a grade higher than the correct grade shall be re-marked by the Inspector, and, if otherwise complying with these regulations, branded or stamped by the Inspector as provided in section four of the Act.

Not less than five per cent. of the boxes of fruit in each consignment shall be opened by the Inspector for examination, and all boxes so opened shall be stamped by the Inspector to that effect.

Only new and clean boxes or packages shall be used by exporters, except in the case of melons.

COOL STORAGE OF TOMATOES.

Experiments in Keeping Qualities.

By D. B. Adam, B. Agr. Sc., Department of Agriculture.

Some experiments were carried out last year with fairly green tomatoes, packed in bran, and stored at 32° F. Though the fruit remained firm and sound, it did not develop either colour or flavour. This year experiments were made with half, three-quarter, and fully ripe fruit. A case in each condition was stored at 35° and 33° F. The relative merits of the direct expansion and air circulation systems, and a combination of the two, were also tested. A later consignment from another district was stored at 31° F.

All fruit when received was in excellent condition, being firm and free from disease. It was noted, however, that some of the fruit had been plucked, so that the whole stalk, together with the persistent calyx, had remained on the vine. It is desirable to leave a short piece of the stalk on the fruit, as this protects the stalk end from injury. If no stalk be left with the fruit, the process of picking produces an injury through which fungal infection may take place.

The fruit was received on the 9th March, packed in flat bushel cases. It was examined at frequent intervals. After three weeks mould development was noted about the calyx end of the tomatoes stored in the direct expansion chamber at 35° F. Within another week fruit stored in the other two chambers at 35° F. showed signs of mould development.

Soon after the first development of mould the fruit began to get soft, even in parts remote from the points of mould infection. This softening was due to the layer immediately beneath the epidermis losing its rigidity. Concomitantly with this softening, which at first was irregularly localized, but soon became general, moulds spread rapidly, and the fruit, if handled at all, broke up very easily.

Ripe tomatoes will soften more rapidly than three-quarters, medium ripe, or half ripe tomatoes. Green fruit remains firm for the longest period. On the other hand a ripe tomato, while it is sound in store has the best flavour, followed in order by the three-quarter ripe and half ripe fruit.

The second consignment, which was received three weeks later than the first, was stored at 31° F. While in this lot the extent of infection after a definite period was apparently less than in fruit stored at 33° or 35° F., yet some fruit showed evident infection after a three weeks' storage period.

In all cases moulds developed rapidly on the removal of fruit from store. The tomatoes in the second consignment did not show softening after such a short period as did those stored at 35° F. This, however,

may have been due to a difference of maturity and not to a difference in temperature, since the fruit was supplied by a different man, from a different district, and at a different time.

A species of *Alternaria* is the main cause of loss. With this particular fungus an injury to the epidermis is necessary before the disease can affect the fruit. It should be pointed out that under favorable conditions limited development takes place on the surface of the fruit; particularly is this growth found around the calyx. The fruit itself is not affected. The fungus may be rubbed off, and the epidermis will be seen to be entirely free from disease.

These experiments indicate that in each instance the storage life was limited by the development of mould. In picking and storing tomatoes the following should be borne in mind:—

(1) The fruit should be picked when three-quarters ripe, since at this time, while it has a good flavour, it is still firm, and can stand some handling.

(2) Care must be exercised in picking and subsequent handling in order to prevent bruising, and a small portion of the stalk should be left attached to the fruit.

(3) 33° to 34° F. is a satisfactory temperature.

(4) The humidity should be kept as low as is practicable with these temperatures. Air movement in the chamber should be encouraged, as this tends to check mould development.

Soon after the positive development of mould a progressive softening, previously mentioned, apparently due to internal chemical changes, takes place. If fruit which has commenced to soften be removed from store its subsequent break-down is rapid. Here it should be remembered that fully ripe fruit was the first to show signs of softening, followed by the next ripest, and so on. This advantage, however, is set off by the fact that the riper the fruit is the better is the flavour developed. If the middle way be chosen, then a fruit three-quarters ripe gives the most general satisfaction.

Two varieties of tomatoes were also tested. The results did not show any difference in actual storage life. Both varieties deteriorated after three weeks owing to the development of mould.

Summary and Conclusion.

1. The storage life of tomatoes is limited in the first instance by the development of moulds.

2. Efforts should be made to minimise this deterioration by care in picking, handling, &c., and by cool storage practice, which should be directed to obtaining humidity conditions unfavorable to the development of moulds.

3. Soon after the advent of mould development, softening takes place—a condition dependent to some extent on the maturity of the fruit. Softening appears to be the result of internal chemical changes. If so, it may limit absolutely the cool storage life of tomatoes.

4. The successful storage of tomatoes is thus possibly limited to short periods. If handled carefully, storage for a maximum period of three weeks might be possible. In the majority of cases a week or ten days is all that could judiciously be allowed.

5. Cool storage, however, should not be without its use in helping to solve our sometimes frequent tomato gluts.

POULTRY-FEEDING TESTS.

At the State Research Farm, Werribee, a series of poultry-feeding tests were commenced on 1st April, 1923, and will be concluded on 31st March, 1924.

One hundred and eight white leghorns were selected and divided into three pens of thirty-six birds each. None of the birds chosen was bred from a single mating—the object being to test only birds of the quality that may be found in an ordinary farm flock. The birds in the three pens are housed and treated in exactly the same way excepting for the feed given.

No. I.—*Free Choice Pen.*—These birds have all the foods in different hoppers always available. A wire basket is kept filled with green stuff always before them.

No. II.—*Dry Mash Pen.*—There is a dry mash hopper always open in this pen. Chaffed green stuff is fed to these birds at midday, and grain in the litter at night.

No. III.—*Wet Mash Pen.*—The birds are fed with a wet mash in the morning, chaffed green stuff at midday, and grain is fed in the litter at night.

The following are the results obtained up to the 31st July last:—

Table Showing Food Consumed and Eggs Produced.

Month.	Bran.	Pollard.	Barley Pollard.	Oat Pollard.	Meat Meal.	Wheat.	Oats.	Barley.	Crushed Maize.	No. of Eggs Produced.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	
Free Choice Team.										
April ..	12	25	½	½	..	72	41¼	24¾	17	419
May ..	13¼	20	½	¼	..	96¾	32¼	21¾	26½	329
June ..	11¾	9½	2	¼	2½	54	48	14	37½	292
July ..	12¾	10¾	..	3½	11½	98	22¾	11¼	51¾	434
	49¾	65¼	3	4½	14	320¾	144¼	71¾	132¾	1,474
Dry Mash Team.										
April ..	14	23½	..	..	3¾	83	18½	18½	..	281
May ..	13¾	23½	..	..	3½	108	22	22	..	287
June ..	15¾	31¾	..	..	5¾	109	25	..	18½	230
July ..	25¾	43½	..	..	10½	111	35	..	10	387
	69¼	122¼	..	..	23½	411	100½	40½	28½	1,185
Wet Mash Team.										
April ..	25	40	..	..	4½	88	19½	19½	..	398
May ..	29½	49	..	..	10½	96	20	20	..	372
June ..	30	48	..	..	13½	88	20	..	14½	256
July ..	30	50	..	..	16	95	30	..	9	419
	114½	187	..	..	44½	367	89½	39½	23½	1,445

STALLION REGISTER 1923-24

under the "Horse Breeding Act 1919."

(Part I.—Registrations prior to 6th July, 1923.)

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
239	Abbey Mack ..	A	Light ..	W. Lowe ..	Hamilton
459	Abbot's Best ..	A	Draught ..	J. Egan ..	Bobs Camp, Barwite
240	,, Pride ..	A	,, ..	W. H. Gadd ..	The Glen, *viâ* Wodonga
458	Active	A	Thoroughbred	G. Brown ..	Bennison
146	Admiral Howard ..	A	Draught ..	W. G. Holland ..	Sheep Hils
76	Admiral Speary ..	A	,, ..	C. Hill ..	Gama P.O.
198	,, Sperry ..	A	,, ..	Alex. Duff ..	Baringhap
138	Advance	A	,, ..	A. W. Brown ..	Speed
457	Aird Laddie ..	A	,, ..	E. Yeaman ..	P. B. Echuca
263	Albion	A	,, ..	J. Oakes ..	Nathalia
53	Al. Borak ..	A	Light ..	L. Bennett ..	Nullawil
342	Alex. R.	A	,, ..	E. Charles ..	Ultima
287	All Black	6	,, ..	W. Morey ..	Katandrah
137	,, Style	A	,, ..	R. Midchett ..	Bendigo
136	Ambershine ..	A	,, ..	L. A. Gunsser ..	27 Durham-st., Ballarat West
22	Amberstain ..	A	,, ..	J. L. Cumming ..	Berrimal
550	Angle Jack ..	A	,, ..	C. T. Hillas ..	Double Gully, Tallangatta
503	Aristocrat ..	A	,, ..	R. Price ..	Wallacedale South
456	Assembler ..	A	,, ..	J. Ferguson ..	52 Peel - street South, Ballarat East
454	Attractions Champion	A	Draught ..	Wm. Morley ..	Rutherglen
199	Avonlea	A	,, ..	Jas. Leitch ..	Wodonga West
551	Axedale Prince ..	A	,, ..	J. McDonald ..	Barrakee North
295	Bannockburn ..	A	,, ..	G. W. Francis ..	Lower Norton, *viâ* Horsham
390	Barbour II. ..	A	,, ..	T. McClelland ..	Birchip
455	Barney II. ..	A	Light ..	A. W. Thomson	"Monivar," Hamilton
213	Baron	A	Draught ..	M. Murphy ..	Rupanyup
334	,, Bombay ..	A	,, ..	Shiels Bros. ..	Youanmite P.O.
173	,, Clyde ..	A	,, ..	Cunnington Bros	Bamawm
54	,, Crombie ..	6	,, ..	A. P. Johnston ..	Colbinabbin
299	,, Fenwick ..	A	,, ..	W. Gardiner ..	Waaia
286	,, ,, ..	A	,, ..	H. C. Wilson ..	Yarrabert - st., Raywood
219	,, Juno ..	A	,, ..	Manifold and Co.	Purrumbete, Weerite
327	,, Lee ..	3	,, ..	J. R. Stokes ..	3 Bloomberg-st, Abbotsford
147	,, McKie ..	A	,, ..	J. A. McDougall..	Cosgrove
104	,, McLean ..	A	,, ..	D. W. Stewart ..	Logan
495	,, McLeod ..	A	,, ..	David Mitchell Estate	Lilydale

STALLION REGISTER, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
184	Baron Major ..	3	Draught ..	Department of Agricultural Research Farm	Werribee
103	,, May ..	6	,, ..	H. D. Oberin ..	Goornong
112	,, of Dalmore ..	A	,, ..	J. R. Henty ..	Pakenham
289	,, Stanley ..	A	,, ..	P. F. Cantwell ..	Tooronga, Mt. Egerton
37	,, Stewart ..	A	,, ..	J. W. Hansen ..	Baulkamaugh
590	,, Style ..	5	,, ..	A. J. A. Browne	Werribee
221	,, Watson ..	A	,, ..	Manifold and Co.	Purrumbete, Weerite
290	,, Wattee ..	6	,, ..	F. Nagorcka ..	Tarrington
223	,, Weerite ..	A	,, ..	Manifold and Co.	Purrumbete, Weerite
172	Baron's Idol ..	A	,, ..	J. Carmichael, jun.	Aah Park, *viâ* Mulwala, N.S.W.
543	,, Reserve ..	A	,, ..	E. J. McCabe ..	Mallee Downs, Gerang
473	,, Royal Chief	A	,, ..	T. E. Parry ..	Coonooer Bridge
331	,, Superior ..	A	,, ..	W. Bransgrove ..	Nerrim North
12	Barony	A	,, ..	R. A. Martin ..	Navarre
472	Basil B.	A	Light ..	W. A. Riedill ..	Longala
174	Bawnmoor ..	A	,, ..	Jessa Singh ..	Nyarrin
544	Bay Harold ..	A	,, ..	A. Sutherland ..	10 Palmer st., Oakleigh
546	Beaconsfield Flyer ..	A	,, ..	A. E. Harding ..	Whorouly South P.O.
343	Bell Boy ..	A	,, ..	T. Bandy ..	Waubra
241	,, ..	A	,, ..	A. G. Turnbull ..	Winton, Horsham
148	Belmont Again ..	6	Draught ..	W. A. Creighton	Alexandra
569	,, Chimes ..	A	Light ..	C. S. Walker ..	Swan Hill
397	Berkeley Bantam ..	A	Pony ..	R. Crozier ..	South Morang
242	Bickie	A	Light ..	A. G. Turnbull ..	Winton, Horsham
102	Black Imp ..	A	Pony ..	F. M. Orton ..	Murmungee
88A	,, Prince ..	A	,, ..	Thos. Gaudie ..	Thoona
508	,, Tom ..	A	Light ..	A. Potter ..	Naroghid
2	Blainwood ..	A	,, ..	H. Gregersen ..	Benalla
55	Bobby	A	Pony ..	Geo. Officer ..	Woolthorpe
453	Bobniak	A	Light ..	H. F. Clarke ..	Miepoll, *viâ* Euroa
101	Bold Action ..	6	Draught ..	E. Pearce ..	Rupanyup
285	,, Agitation ..	A	,, ..	Chamberlain and Ritchie	Morwell
135	,, MacGregor ..	A	,, ..	W. McNaughton	Walpeup
452	,, Rowan ..	A	Light ..	A. L. Turnbull ..	Sebastopol, Ballarat
447	Bon Wickliffe ..	A	,, ..	Jas. Ford ..	Wickliffe
56	Bonnie Wizard ..	A	Pony ..	J. J. Cox ..	Nathalia
504	,, Scotchman ..	A	Draught ..	R. Price ..	Wallacedale South
82	Bower Bank ..	A	Light ..	John O'Bree ..	Piangil
212	Bramhope Monarch	A	Draught ..	G. Hicks ..	Miram
57	,, Paladin ..	A	,, ..	W. H. Alford ..	Modewarre P.O.
81	Brassey's Pride ..	6	Pony ..	A. E. Millar ..	Hopevale
19	Breastknot ..	A	Draught ..	W. J. Moll ..	Dimboola

Stallion Register, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
451	Brigham Again ..	A	Pony ..	J. Barns ..	Euroa
564	Bright Star ..	A	„ ..	J. T. Neeson ..	Chetwynd
381	Briton	A	Draught ..	P. Petersen ..	Cravensville
340	Briton's Pride ..	6	„ ..	A. Cameron ..	Karnak, *viâ* Goroke
211	Bronte's Pride ..	A	Pony ..	J. V. Hosking ..	Towaninnie
552	Bronzewood ..	A	Thoroughbred	Quinlan Bros. ..	Oaklands Junction
450	Buchlyvie's Choice ..	A	Draught ..	W. J. Westendorf	Dimboola
284	Bundoran ..	A	Light ..	A. Graham ..	Bacchus Marsh
474	Bute Laddie ..	A	Draught ..	Crawford Bros. ..	Linwood, Tatura
58	Calais	A	Light ..	G. Officer ..	Woolsthorpe
572	Camperdown ..	A	Pony ..	W. J. Clark ..	Sunbury
59	Canny	6	Thoroughbred	T. A. Griffiths ..	Glenrowan
149	Cape Sky	A	„	G. Buckley ..	Wickliffe
194	Captain Douglas ..	5	Draught ..	C. S. Rodda ..	P.B., Warracknabeal
243	Carmichael ..	6	„ ..	J. A. Pearse ..	Glenrowan West
527	Carovita	A	Pony ..	W. F. Clarke ..	Heyfield
75	Cedric	A	Draught ..	S. L. Moodie ..	Ardoon, Warracknabeal
449	Chal	A	Thoroughbred	T. J. Scott ..	Everton
378	Chenard	6	Light ..	W. T. Carter ..	Coleraine
23	Cicero	A	Draught ..	R. Lloyd ..	Kyabram
317	Clan Fingen ..	A	Thoroughbred	Ned's Corner Company	Mildura
9	Clarey	A	Pony ..	J. Jones ..	Mywee
65	Claymore	A	„ ..	J. P. Hanrahan	Ballan
464	Clem	A	„ ..	M. Skeyhill ..	Weerite
283	Clyde Boy ..	A	Draught ..	H. Goldsmith ..	Corack
567	„ Laddie ..	A	„ ..	J. Alexander ..	Caniambo
78	Cock Robin ..	A	„ ..	W. Studman ..	Lucknow
60	Colonel Dale ..	A	„ ..	T. F. Major ..	McMillans P.O.
222	Commodore Nut ..	A	Pony ..	Manifold and Co.	Purrumbete, Weerite
20	Commonweal ..	A	Draught ..	W. C. Holt ..	Foster
475	Congress	A	Pony ..	J. Reid ..	Warrion P.O.
477	Contractor ..	A	Light ..	J. T. Ovens ..	Cooma
476	Coronation Day ..	A	Pony ..	H. W. Atkinson ..	Gritjurk, *viâ* Coleraine
320	Count Rhymney ..	A	„ ..	Bourke Bros. ..	Monomeith
193	Craig Eran ..	3	Draught ..	W. Walter ..	Tatura
391	Craigieburn Premier	A	„ ..	P. Rentsch ..	Croxton East
224	Crest of the Wave ..	A	Thoroughbred	F. Hender ..	Franklinford
73	Crown Jewel ..	A	Draught ..	Kuhne Bros. ..	Rainbow
337	Culloden	A	Light ..	A. Millard ..	Yaapeet
468	Cymro Bach ..	A	Pony ..	H. S. Rudduck ..	Box 40, Exchange P.O., Collins-street, City
478	Cymro Bar ..	A	„ ..	A. Dunn ..	Trawalla
210	Cyndett II. ..	A	„ ..	G. J. Marshall ..	141 Stawell-street, Burnley
186	Dalmeny	A	Draught ..	A. J. Ritchie ..	Arawata
72	Dalmore	A	„ ..	H. Wood ..	Bangerang

STALLION REGISTER, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
479	Dalyston	A	Light ..	J. Kortright ..	Lara
262	Dan Again ..	A	Draught ..	C. J. Dunster ..	Willaura
339	Dancing Bell ..	A	Light ..	W. C. Marshall ..	Beremboke
480	Dandy	A	Pony ..	P. Purves ..	Green Hills, Rosebud
282	,, Jim ..	A	,, ..	E. McDonald ..	Tangambalango
328	,, Nut ..	A	,, ..	E. S. Small ..	San Remo
443	Dandy's Pride ..	A	,, ..	G. Bennett ..	Albury, N.S.W.
69	Danedite	A	Draught ..	P. Gardiner ..	The Lake, Carlisle River
566	Darlings Comet ..	A	,, ..	Brook Bros. ..	Moe
553	Decorator ..	A	Pony ..	F. E. Jennings ..	Inglewood
142	Delcampbell Cleve ..	6	Light ..	C. E. Baker ..	110 Tinning-street, West Brunswick
554	Detonator ..	A	Pony ..	Quinlan Bros. ..	Oaklands Junction
556	De Wet	A	Thoroughbred	R. Humphrey ..	Cudgewa
61	Dibdale	A	,,	G. Officer ..	Woolsthorpe
441	Dick Alto ..	A	Light ..	A. Cheesley ..	Barnawartha
481	Digger	A	,, ..	R. Dunbar ..	Harston, *viâ* Byrneside
503	Dillon Bell ..	A	,, ..	S. J. Lewis ..	Parkers Plains, Baringhup
70	Dimboola	6	Thoroughbred	W. Rogers ..	Russell's Creek, Warrnambool
440	Direct Alto ..	6	Light ..	H. D. Morse ..	Bridgewater
333	,, Argot ..	5	,, ..	F. Matchett ..	Bendigo
399	,, Wilkes ..	A	,, ..	E. Scown ..	Terang
439	Director	A	Pony ..	J. Hurst ..	Kilmore
338	,, ...	A	Light ..	H. T. Summis ..	Murphy's Creek, *viâ* Tarnagulla
134	Directway.. ..	A	,, ..	R. Matchett ..	Bendigo
175	Don Alto	A	,, ..	G. Maxwell ..	Green - street, Wangaratta
483	Donald	A	Pony ..	W. E. Attiwill ..	Boorkor, Hexham
150	Donald's Best ..	6	Draught ..	D. Kelly ..	Kunat
100	Dorregal Chief ..	A	,, ..	P. R. Olson ..	Jeparit
62	Douglas Chief ..	6	,, ..	W. J. Byrne ..	Beulah
557	Dreadnought ..	A	,, ..	C. Le Lievre ..	Corack East
321	Druce	A	Light ..	J. Holt ..	Wycheproof
218	Drum Laddie ..	A	Draught ..	S. Brunt ..	Kyabram
265	Drumore	A	Thoroughbred	J. McPhee ..	"Inverness," Merino
396	Drysdale	A	Draught ..	D. Crozier ..	South Morang
500	Dundonald ..	6	,, ..	J. Adams ..	Swan Hill
494	Dunsby's Pride ..	A	,, ..	J. R. Baldwin ..	Gre Gre Village
209	Earlmont	A	Light ..	A. J. Snow ..	Stanhope
98	Earl San	A	Thoroughbred	H. Maguire ..	Stratford
336	Eastern Star ..	A	Draught ..	L. G. McLean ..	Boolite
345	Echelon	A	Light ..	H. T. Nicholas ..	Thornton Lower
438	Emulator's Pride ..	A	,, ..	W. McArthur ..	Ferndale, Noorat
484	Ettrickdale ..	A	Pony ..	F. Robinson ..	Huon
21	Excel	A	,, ..	W. C. Holt ..	Foster

STALLION REGISTER, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
383	Eye Glass ..	A	Thoroughbred	W. B. Cumming ..	Mt. Fyans, Camperdown
384	Fairhaven ..	A	Draught ..	P. Smith ..	Lismore - road, Skipton
133	Fashion Direct ..	A	Light ..	R. W. Zirkler ..	Kerang
487	Fast Time	A	Pony ..	J. Nevett ..	Toolamba
176	Federal Prince ..	A	Draught ..	G. Luckie ..	Springhurst
555	Federation ..	A	Pony ..	A. Wilson ..	Cororooke
377	Finnimore	6	Thoroughbred	J. Brown ..	Natimuk
195	First Grattan ..	6	Light ..	J. I. Chisholm ..	Cranbourne-road, Dandenong
485	Fitzallen	A	Draught ..	S. P. Vaughan ..	Nyam, *viâ* Warracknabeal
24	Flash Jack ..	A	,, ..	P. McIntyre ..	South Cannum
151	Foreigner	A	Pony ..	C. Ferrari ..	Devondale
183	Fred	A	Draught ..	A. Dunning ..	Numurkah
208	Freedom	A	Light ..	J. Montgomery ..	Milawa
298	Futurist	A	Pony ..	E. Allan ..	Ondit
322	Gay Lad	A	Draught ..	J. Archibald ..	Sale
225	General Harvey ..	A	,, ..	Koschitzke Bros.	Bangerang
389	,, Keith ..	A	,, ..	J. Dunlop ..	Bridgewater
63	,, Scotch ..	A	,, ..	J. McIntyre ..	Minyip
141	Gentleman Jack ..	A	Light ..	R. Matchett ..	Bendigo
486	Gisborne	A	Draught ..	C. E. Umbers ..	Sea Lake
52	Glen Arthur ..	6	,, ..	C. T. Henderson	Weatherboard
281	Glenlea	A	,, ..	A. F. Smith ..	Nypo
244	Glenmarkie ..	A	,, ..	D. W. Drysdale ..	Yea
437	Glenmooney ..	A	Light ..	G. H. Palfrey ..	Campbellfield
558	Glenmore	A	,, ..	P. Murphy ..	Bindi P.O.
376	Glenspean ..	A	Thoroughbred	A. Cameron ..	Warracknabeal
436	Golden King ..	A	Light ..	H. Henry ..	Bowman's Forest East
488	Goldenwood ..	A	,, ..	J. T. Ovens ..	Cooma
64	Gossoon Bells ..	A	,, ..	W. Leach ..	Rheola
245	Gratton Bells ..	A	,, ..	T. Shearwood	Dooen North
152	,, Junior ..	A	,, ..	W. J. Parish ..	Horsham
25	Grey Marvin ..	A	,, ..	J. S. W. Uren ..	Krowera
346	Guy Fox	6	,, ..	H. Maddison ..	Mongan's Bridge, Dederang
207	Guy Tedd ..	A	,, ..	W. Williams ..	St. Arnaud
196	Hafren Sensation ..	A	Pony ..	Miss B. Bruce-Reid	Bundoora
292	Halcyon	A	Light ..	J. M. Maclellan ..	241 Dandenong-road, Windsor
108	Hamboltonian Direct	A	,, ..	R. S. Wright ..	Yarrabert P.O.
319	Hames	A	,, ..	A. Dean ..	Tinamba
51	Hamiltonian ..	A	Draught ..	A. Steele ..	Woomelang
435	Handyman ..	A	Thoroughbred	G. Wells ..	Euroa
206	Happy Jack ..	A	Pony ..	J. B. Atchison ..	Southern Cross
559	Happy Vein ..	A	Thoroughbred	Fitzpatrick Bros.	Boort
347	Harmattan ..	A	,,	C. Tobin ..	Eskdale
132	Harry Almont ..	A	Light ..	S. Pemberton ..	Wedderburn
3	Harry Lauder ..	A	Draught ..	R. E. Keller ..	Lorquon
499	Havoc	A	Light ..	H. S. Bell ..	Minyip

Stallion Register, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
434	Hayston	A	Thoroughbred	A. E. Barker ..	Kyabram
490	Heather King ..	A	Pony ..	R. Dunn ..	FairHills,Tahara
293	Hermes of Shetland Heights	A	,, ..	J. M. Maclellan ..	241 Dandenong - road, Windsor
187	Hero	A	,, ..	T. Park ..	North Wonthaggi
433	,, ...	A	Draught ..	J. Carruthers ..	Picola West
8	,, II.	A	Pony ..	Greaves Bros. ..	Budgeree, Yannathan
153	,, Laddie ..	A	Draught ..	H. F. Robinson..	Kerang
205	Hiawatha of New Zealand	A	,, ..	H. E. Taylor ..	Pier Millan
561	High Commissioner..	6	,, ..	S. Clark ..	Bundalaguah, Sale
190	High Honor ..	A	,, ..	C. H. Feldtmann	Major Plains
461	Highland Cleve ..	A	Light ..	M. L. V. Greatz..	Irymple
246	Hillhead Knight ..	A	Draught ..	R. E. Krause ..	Boolite
348	Hivites	A	Thoroughbred	F. N. Heywood ..	Toongabbie
332	Hoprig	A	,,	R. F. Carmody ..	Everton
254	I am Here.. ..	A	Pony ..	A. T. Ingram ..	Orbost
491	Invincible ..	A	Draught ..	J. F. Ryan ..	Bearii R.O.
278	Ipidi	A	Thoroughbred	A. Kennedy ..	Arcadia
79	Ironsides	6	,,	M. Hore ..	Talgarno
432	Jack Style ..	A	Light ..	P. McEntee ..	Cudgee
431	James Osterley ..	A	,, ..	A. Huddleston ..	South Geelong
267	Jinghal King ..	A	Thoroughbred	J. Reid ..	Ararat
294	J.N.S.	A	Light ..	Wilson Bros. ..	Swan Hill
248	John Douglas ..	6	Draught ..	V. P. Dahlenburg	Winian East
139	Jolly Maltster ..	A	Thoroughbred	Defence Department	Melbourne
26	Karamu-Glenmarkie	A	Draught ..	J. J. Owens ..	Gannawanna
268	Kelmscott II. ..	6	,, ..	A. W. Lackman..	Care of Agricultural Society, Murrayville
560	Kelms Pride ..	A	,, ..	J. Dugdale ..	Myrniong
28	Khamasin	6	Light (Arab)	S. Winter-Cook ..	Hamilton
204	Kilburnie	A	Draught ..	A. E. Whitfield ..	Marong
280	King Albert ..	A	,, ..	G. Francis ..	Horsham
279	,, Ballana ..	A	,, ..	J. H. Kennett ..	Kaniva
50	,, Clyde ..	A	,, ..	A. G. Buchanan	Seymour-street, Terang
323	,, Duncan ..	A	,, ..	P. Leydon ..	Cooma P.O., Terang
249	,, Jimmy ..	A	Draught ..	J. Henderson ..	Leongatha
430	,, Jimmy II. ..	A	Pony ..	R. N. Larcombe	Mt. Moriac
465	,, of Clubs ..	A	Draught ..	J. Peard ..	Terang
49	,, of the Kings ..	A	,, ..	C. N. Hokin ..	Tylden
507	,, of the Roses II.	A	,, ..	M. McGillivray ..	Bald Rock
344	,, of the Shepherds	A	,, ..	E. R. Campbell	Nypo
260	Kingling	A	Thoroughbred	M. Widdicombe..	Gymbowen
489	Kinlock	A	Draught ..	W. Hicks ..	Miram
27	Knight Royal ..	A	,, ..	A. C. Gready ..	Carron, *viâ* Sheep Hills
549	Laird Again ..	A	,, ..	P. Davey ..	Miner's Rest
154	Laird o' Gowrie ..	A	,, ..	T. Smith ..	Rushworth

STALLION REGISTER, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
429	Lanark's Pride ..	A	Draught ..	J. Hill ..	Yanac
266	Lancashire Lad ..	6	,, ..	W. Robinson ..	Armstrong
467	Latest Fashion ..	A	,, ..	F. W. Benson ..	Tarwin Lower
29	,, Style ..	A	Light ..	T. Buckley ..	Romsey
155	Le Rosier	A	,, ..	Emily Parith ..	Horsham
48	Lee Creek Squire ..	A	Draught ..	A. K. Lange ..	Armytage
109	Leevialand ..	A	Light ..	A. Bickley ..	Trafalgar
428	Leo	A	Pony ..	S. Mirams ..	South Warragul
349	Lieutenant J. ..	A	Light ..	G. Smith ..	Pirron Yallock
324	Light o' Frisco ..	A	,, ..	J. H. Lucas ..	Macarthur
99	Linkwood ..	A	Draught ..	W. J. Jenkin ..	Willaura
14	Lion Prince ..	A	,, ..	J. F. Hurley ..	Bobinawarrah
427	Little Bill ..	A	Light ..	A. T. Corner ..	Fosterville P.O.
131	,, Billy ..	A	Pony ..	C. Pratt ..	Watchupga
156	,, Comet ..	A	,, ..	T. McNally ..	Seymour
226	,, Eumarrah ..	A	,, ..	R. Painter ..	Leaghur
463	,, Jim ..	A	,, ..	D. Scott ..	Maldon
492	,, Lonsdale ..	A	,, ..	J. Neeson ..	Chetwynd
426	,, Mickey ..	A	,, ..	C. Simon ..	Leongatha
293	,, Milton ..	A	Draught ..	J. Hives ..	Tempy P.O.
576	,, Wonder ..	A	Pony ..	G. C. Roughead	Ruby
130	Lock Albyn ..	A	Draught ..	N. O'Keefe ..	Pine Lodge Railway Station
562	Lord Aldie ..	A	,, ..	S. E. Mackieson..	Buchan
350	,, Armadale ..	A	,, ..	H. Thomson ..	Newlyn
227	,, Bingen ..	A	Light ..	E. J. Janetzki ..	Jeparit
577	,, Dalmuir ..	A	Draught ..	E. W. Harders ..	Dimboola
493	,, Dundee ..	A	,, ..	T. Hayes ..	Hardies Hill
97	,, Everest ..	A	,, ..	G. R. Ladson ..	Mincha West
351	,, Glengyle ..	A	,, ..	W. Linehan ..	Wunghnu
202	,, Jellicoe ..	A	,, ..	McMahon Bros. ..	Galah
496	,, Northcote ..	A	,, ..	Wm. Hicks ..	Pleasant Hills, Miram
325	,, Plunton ..	A	,, ..	M. J. and J. J. Runceman	The Pines, Mallan, N.S.W.
448	,, Ronald ..	A	,, ..	W. Sharrock ..	Vite Vite
47	,, Wallace ..	A	,, ..	C. E. Cartledge ..	Kilmany
177	,, Welkin ..	A	Thoroughbred	W. and H. Carmichael	Swan Hill
530	Lost Time ..	A	,, ..	A. Martin ..	Maffra
497	Loudoun Squire ..	A	Light Hack..	J. Dunlop ..	Birregurra
1	Loyalist	A	Draught ..	O. Gray ..	Wedderburn
129	Lu Lus Dandy ..	A	Pony ..	Sir Rupert T. H. Clarke	Lancefield Junction
316	Lucky Jim ..	A	Draught ..	J. Morris ..	Woolsthorpe
531	Lue Ribbons ..	A	Light ..	L. Williams ..	Ross Creek
326	Lymm Forest Boy ..	A	Draught ..	M. Attwood ..	Roseberg
128	Lymm Truffle 2nd ..	6	,, ..	J. C. Wallis ..	Miram
277	Lyndale	A	,, ..	H. Conn ..	Barrakee
425	Lyndhurst ..	6	,, ..	D. J. McKenzie ..	Warracknabeal
144	Lyntourie ..	6	Thoroughbred	L. R. Clarke ..	Newstead
140	McGregor's Fancy ..	A	Draught ..	R. J. Wilson ..	Krowera, *viâ* Loch
271	Macedon Hero ..	6	,, ..	P. Williams ..	Riddell's Creek
46	Magician	A	,, ..	T. Adkins ..	Korumburra

STALLION REGISTER, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
297	Magician J of Shetland Heights	2	Pony (Shetland)	Mrs. J. Maclellan	241 Dandenong-road, Windsor
526	Mainstitch ..	A	Thoroughbred	F. C. Mackay ..	Violet Town
545	Major Dale ..	A.	Draught ..	J. Forster ..	Boort
4	Major Douglas ..	3	,, ..	V. Dahlenberg ..	Winnia East, *viâ* Nhill
94	Major Lawrence ..	A	,, ..	M. Parnell ..	Katamatite
252	Major Ribbonwood	6	Light ..	F. W. Grabsch ..	Horsham
532	Maldon	A	Pony ..	J. E. Sage ..	Somerville
498	Maltstead ..	6	Light ..	E. J. Wright ..	Flynn's Creek
375	Maori Chief ..	A	,, ..	J. Caldow ..	Winchelsea
501	Maori Jack ..	A	Draught ..	A. Potter ..	Naroghid
6	Marcus	A	Light ..	W. E. J. Craig ..	8–22 Elizabeth-street, Melbourne
394	Maringa ..	6	,, ..	E. Collins ..	Dunkeld
125	Markhope ..	A	Thoroughbred	Trustees, Sir Rupert Clarke	Lancefield Junction
533	Marshall Clyde ..	A	Draught ..	J. Nunn ..	Birchip
374	Master Brigham ..	A	Pony ..	S. Waters ..	Carboor
571	Master McKinney ..	A	Light ..	J. W. Keirce ..	Buckrabanyule
578	Master Valve ..	A	Pony ..	A. Lang ..	Winter's Flat, Castlemaine
565	Master Wattee ..	A	Draught ..	Brock Bros. ..	Moe
568	Mauritius	A	Light ..	J. B. Zander ..	King-street, Melbourne
361	Medbourne Prince ..	A	Draught ..	F. Shaw ..	St. Arnaud
68	Merry Oliver ..	A	Thoroughbred	E. R. de Little ..	Sth. Caramut
373	Message	A	Light ..	A. J. Tack ..	Kongwak
201	Michael	A	Pony ..	Mrs. Bell ..	Blackwood Flynn
372	Middlemarch ..	A	Draught ..	M. J. Egan ..	Charlton
579	Model's Fancy ..	A	,, ..	W. D. Hopper ..	Terrick Sth.
424	Moeser	6	,, ..	J. Tallent ..	Craigieburn
80	Moira Lad ..	A	,, ..	C. R. Cunnington	Bamawm Extn.
534	Monk	A	Pony ..	R. Angus ..	Springvale
185	Montrae Bold ..	6	Draught ..	E. Don ..	Newham
315	Monty	A	Pony ..	G. J. Morris ..	Woolsthorpe
371	Moolap	A	Light ..	T. Mitchell ..	Durham Lead
157	Morocco Lad ..	A	Draught ..	Mrs. E. Parish	Horsham
87	Moving Picture ..	A	Thoroughbred	Executors, T. Maidment	Moyston
506	Napoleon	A	Draught ..	S. J. Lewis ..	Parker's Plains, Baringhup
7	Narahquong ..	A	Thoroughbred	H. Garner ..	Yan Yean
423	Never Forget ..	A	Pony ..	F. Ballard ..	Picola
422	Newfield's Baron ..	A	Draught ..	Coe Bros. ..	Coleraine
30	Newton Banks ..	A	,, ..	O. Shaw ..	Wooriwyrite, *viâ* Terang
178	Newton Mains ..	A	,, ..	J. A. G. Wilson	Kenilworth T.P.O., *viâ* Moyne
71	Newton Stewart ..	A	,, ..	A. H. Borgelt ..	Tarranginnie Rly. Stn.
261	Newton Style ..	A	,, ..	Currell Bros. ..	Cobden
124	Newton's Best ..	A	,, ..	C. A. Graham ..	Rupanyup
228	Newton's Sensation	A	,, ..	R. Banko ..	Simmies, Koyuga

STALLION REGISTER, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
11	Nigger Minstrel ..	6	Thoroughbred	D. W. Heaney ..	Benalla
215	Nimrod	A	Pony ..	Geo. Small, junr.	Birchip P.B.
123	Norval Junior ..	A	Light ..	J. English ..	Bulart, *viâ* Cavendish
580	Oakburn	A	Draught ..	A. J. Pratt ..	Wedderburn
581	Oakland's Pride ..	A	,, ..	C. F. Dolan ..	Box 27, Ouyen
179	Oakwood Direct ..	A	Light ..	A. McCracken ..	Barney's Reef
90	October ..	A	Thoroughbred	H. F. and F. Hoysted	Gray-street, Wangaratta
444	Onward	A	Draught ..	H. T. Wilson ..	Wodonga
359	Onward O ..	A	,, ..	E. Coward ..	Congupna Rd. R.S.
421	Orewar	A	Thoroughbred	T. J. Pratt ..	Colac
314	Ormond Dale ..	6	Draught ..	Letcher Bros. ..	Donald
110	Osprey Junior ..	A	Light ..	J. Axford ..	Terang
510	Our Guide ..	A	,, ..	Geary Bros. ..	Tungamah
420	O.Y.K.	A	,, ..	G. H. Palfrey ..	317 Little Collins-street, City
419	Patchwork	A	,, ..	H. Milte ..	Lascelles
122	Patrician ..	A	Draught ..	W. Gibbons ..	Galah
418	Patrician Pride ..	6	,, ..	P. Egan ..	Bealiba
121	Patriot	A	,, ..	A. G. Mibus ..	Croxton East
313	Pearlyn	A	Light ..	F. W. Bowden ..	Won Wron
547	Peterhof	A	Thoroughbred	W. T. Rowe ..	Wallenduc
31	Petrillot	A	,,	R. Barr Smith ..	Mt. William, Willaura
446	Piper	A	Pony ..	J. Ford ..	Wickliffe
264	Pirateer	A	Light ..	D. McArthur ..	Victoria Valley
573	Poilu	A	Pony ..	D. L. Goodwin ..	Kaniva
318	Polo King ..	A	,, ..	B. W. Canole ..	Dartmoor
511	Pompy	A	,, ..	E. H. B. Cleland	Newhaven
358	Preble	6	,, ..	A. F. McKenzie	Hexham
67	Predominate	A	Light ..	E. R. de Little ..	Sth Caramut
45	Premier Again ..	6	Draught ..	D. C. Greig ..	c/o Adamson, Strettle and Co., Melbourne
417	Premier Jack ..	A	,, ..	V. Vaughan ..	Condah
276	Premier Montgomery of Willow Bank	A	,,	E. Doherty ..	Congupna
512	Premier Ward ..	A	,, ..	J. S. and R. Jobling	Mumbel Plains
582	Pretty Bobby ..	A	Pony ..	Jas. Orr ..	210 Victoria-street, Ballarat East
86	Pride of Clutha ..	A	Draught ..	J. H. Cornfoot ..	Winchelsea
513	Pride of Lochiel ..	A	,, ..	J. T. Ovens ..	Cooma
583	Pride of the Ponds ..	A	,, ..	E. Drayton ..	Waurn Ponds
470	Pride of the South ..	A	,, ..	H. G. Hill ..	Nurrabel
584	Prince Bally ..	A	Pony ..	H. C. Bird ..	Yarram
382	Prince Bellinda ..	A	Light ..	O. Lock ..	Thorpdale
180	Prince Bells ..	A	,, ..	R. Youren ..	Natte Yallock
158	Prince Benmore ..	A	Draught ..	W. D. Starbuck ..	Rupanyup
120	Prince Coupar ..	A	,, ..	L. Clarke ..	Newstead

Stallion Register, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address
		Yrs.			
416	Prince Douglas ..	A	Light ..	P. Martin ..	Molesworth
392	,, Hairod ..	5	Pony ..	Miss B. B. Reid	Bundoora
159	,, Harold ..	A	Light ..	C. E. Darley ..	Hopetoun
229	,, Lyall ..	A	Pony ..	G. L. Buchanan..	Horsham
119	,, Maurice ..	A	Light ..	W. P. McNaughton	Walpeup
415	,, of Nullan ..	A	Draught ..	R. V. Quick ..	Brim
585	,, Que ..	A	Pony ..	A. E. Callow ..	520 Mair-street, Ballarat
586	,, Rhymney ..	A	,, ..	E. Kennedy ..	Bass
515	,, Ribbon ..	A	Light ..	W. A. Riedell ..	Tongala
514	Punch	A	Draught ..	E. H. B. Cleeland	Cowes, Phillip Island
587	Quality	6	Pony ..	A. E. Callow ..	520 Main-street, Ballarat
414	Quamby ..	A	,, ..	P. McEntee ..	Cudgee
251	Quatta's Baron Belmontian	6	Draught ..	R. F. Carmody ..	Everton
413	Quattas Belmont ..	A	,, ..	M. Lindsay ..	Baranduda
230	Radium	A	Light ..	Manifold and Co.	Purrumbete, Weerite
312	Reality Rex ..	A	Pony ..	J. Archibald ..	Sale
311	Red Lion	6	,, ..	G. H. Whitehead	Minhamite
588	Red Wilkes ..	A	Light ..	E. Rasp ..	5 Eyre-street, Ballarat
296	Referee	A	Draught ..	E. Allan ..	Ondit
96	Relight	A	Light ..	D. Cameron ..	Newham
370	Report	A	,, ..	S. Fraser and Sons	440 Little Collins-street, City
529	Rhymney II. ..	A	Pony ..	Mrs. G. Roberts	Goroke
412	Ribbon Bells ..	A	Pacing ..	Beattie Bros.	Tungamah
411	Ribbon Wheel ..	A	Light ..	V. Vaughan ..	Condah
275	Richard III. ..	A	Pony ..	A. Ruttle ..	Inverloch
535	Rimfire	A	,, ..	Lucas Bros. ..	Carlisle River
516	Robin Roy ..	A	Light ..	C. Paulin ..	89 Bay-street, Port Melbourne
466	Rocket	A	Pony ..	A. W. Thomson	Hamilton
570	Roseworthy ..	A	Light ..	A. Stewart ..	c/o Adamson, Strettle and Co., Melbourne
253	Royal Albert ..	A	Draught ..	R. J. Evans ..	Bushfield
93	,, Ben ..	A	,, ..	J. H. Hamilton ..	Inverleigh
469	,, Bute ..	A	,, ..	G. Luckie ..	Springhurst
589	,, Churchill ..	A	,, ..	A. Kennedy ..	Tatura
189	,, Comedy ..	6	Thoroughbred	A. Sutherland ..	Welshpool
410	,, Dandy ..	A	Pony ..	C. Waiting ..	Cohuna
575	,, Derby ..	5	Light ..	G. H. Eastaugh	743 Burwood-road, Auburn
32	,, Duke ..	A	Draught ..	Executors late C. W. Dennert	Hamilton
160	,, Flush ..	A	,, ..	M. Colton ..	Terang
357	,, Garvin ..	A	,, ..	G. F. Brown ..	Winchelsea
517	,, Hero ..	A	,, ..	G. Giddings	Sea Lake

STALLION REGISTER, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
88	Royal Mac ..	A	Light ..	Charity Bros. ..	Serpentine
518	,, Mint ..	A	,, ..	L. A. Harper ..	Rutherglen
388	,, Prince ..	A		G. G. Goudie ..	Ultima
85	,, Robin ..	A	Draught ..	J. Boyle ..	Verdant Vale, North Boort
409	,, Salute ..	5	,, ..	G. Brown ..	Bennison
237	,, Saxon ..	A	,, ..	J. M. Hunter ..	9 Hilda - crescent, Hawthorn
408	,, Shepherd ..	A	,, ..	J. McBean ..	Miga Lake
591	,, Standard ..	A	,, ..	K. Cameron ..	Warracknabeal
387	,, Success ..	A	,, ..	W. Elsom ..	Dart Dart
592	,, Whips ..	A	Light ..	A. J. Walter ..	Warragamba
593	,, Willie ..	A	Draught ..	K. Cameron ..	Warracknabeal
302	Royalty	A	Pony ..	W. Coe ..	Coleraine
255	R. W. Estell ..	A	Light ..	A. E. Lobb ..	Lamplough
166	St. Aidan	A	,, ..	M. Cribbes ..	Faraday
106	St. Simon	A	Draught ..	G. J. Butler ..	Carisbrook
84	Safe Voyage ..	A	Light ..	V. Meyers ..	Lakwood
471	Sam Huon ..	A	,, ..	J. P. O'Brien ..	110 Powlett-street, East Melbourne
161	Satellite Junior ..	A	Pony ..	Saunder Bros. ..	Youarang
44	Satellite's Pride ..	A	Light ..	R. Berry ..	Navarre
231	Saturn	A	Pony ..	A. J. Plum ..	Docker's Plains
197	Scotch Thistle ..	5	Draught ..	J. R. Stokes ..	Care of Adamson, Strettle and Co., City
15	Scotland Yet	A	,, ..	E. A. Riether ..	Balliang
191	Scotland's Bloom ..	A	,, ..	W. G. Parish ..	Horsham
162	,, Fancy ..	A	,, ..	Alexander Bros...	Carlisle River
307	Scottish Lad ..	A	,, ..	D. L. Bodey ..	Jung
536	,, Peer ..	A	,, ..	Tyrrell Downs Agricultural and Pastoral Company Limited	Tyrrell Downs, Sea Lake
528	Scotty	A	,, ..	H. Roulston ..	Muskerry E.
574	Sea King	A	,, ..	A. McCready ..	Colac
238	Seldom	A	Light ..	R. N. Keating ..	Antwerp
143	Senator	A	Draught ..	J. R. Stokes ..	3 Bloomberg-street, Abbotsford
380	Shandon Bells ..	A	Light ..	T. Long ..	Nhill
274	Shanter's Ghost ..	A	Pony ..	P. E. Cutche ..	Clear Lake
111	,, Pride ..	6	Draught ..	G. A. Thompson	Kyneton
335	Sheriff Huon ..	A	Light ..	V. Thomas ..	6 Hope-street, Richmond
407	Shepherd	A	Draught ..	Warren Bros. ..	Stawell
163	,, Plaid ..	A	,, ..	Emily Parish ..	Horsham
164	Shepherd's Boy ..	A	,, ..	I. Kelly ..	Korong Vale
594	Shifty Dick ..	A	Light ..	J. T. Neeson ..	Nareen
406	Siam	A	,, ..	H. Murphy ..	Nanneella
509	Silver Cup ..	A	Draught ..	A. S. McLeod ..	Box 80, Kyabram P.O.
16	,, King ..	A	Light ..	E. D. Scown ..	Terang
310	Silverlight.. ..	A	Pony ..	R. J. Jarvis ..	Cudgewa

STALLION REGISTER, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
165	Silverton	A	Pony ..	J. Rogers ..	Allansford
595	Sir Burnhead ..	A	Draught ..	Boyd Bros. ..	Tarrone, Koroit
369	„ Carlaw ..	A	Light ..	V. J. Byrne ..	Black Heath
33	„ Clyde	A	Draught ..	S. J. Taylor ..	Lake Boga
256	„ Don Pedro ..	A	„ ..	J. McKee ..	Clarendon P.O.
34	„ Douglas Haig ..	A	„ ..	Mrs. J. Biddlecombe	Gold Hill, Shelford
309	„ Everest ..	6	„ ..	A. Ralston ..	Lucknow
405	„ Fabric ..	6	„ ..	Allitt Bros. ..	Diapur
596	„ Goulding ..	A	Pony ..	L. T. Rash ..	5 Eyre street, Ballarat
597	„ Hambletonian ..	A	Light ..	J. H. Uren ..	Maxwell-street, Kerang
404	„ Hector ..	A	Draught ..	F. Wallbridge ..	Somerton
502	„ Lowlander ..	A	„ ..	F. H. Jolly ..	Gerang Gerung
460	„ Mac	A	„ ..	Wm. Blake ..	Rushworth
288	„ Regulus ..	A	„ ..	J. B. Howe ..	Memtic, Bridgewater
308	„ Roderick ..	A	„ ..	W. Byrne ..	Trentham
537	„ Wilfred ..	A	„ ..	A. J. Mackay ..	Coonooer Bridge
113	Skipper	A	Pony ..	G. Hicks ..	Strathallan
273	Skobeloff	A	Thoroughbred	A. Thomson ..	Gnarpeit, Lismore
362	Solomon IV. ..	A	Draught ..	C. H. Perkins ..	Rainbow
356	Some Style ..	A	Light ..	T. F. Armstrong	Campbell's Creek, *viâ* Castlemaine
220	Southern Lad ..	6	Draught ..	G. McKenzie ..	Pullut
598	Splendour ..	A	Light ..	J. McKenna ..	Hartwould, Picola
368	Springbank Lawrence	A	Draught ..	W. H. Crawford ..	Hamilton
538	Springwood ..	A	Light ..	G. J. Vagg ..	Cobden
43	Squib	A	Pony ..	A. Robertson ..	care of A. W. Hobbs, Koria, *viâ* Willaura
92	Stanley May ..	A	Draught ..	G. R. Ladson ..	Mincha West
77	Starlight	A	„ ..	J. Fuller ..	Mitre
462	Stern Anchor	A	Thoroughbred	A. Noble ..	Bleak House, Birregurra
247	Stirling Castle ..	A	Draught ..	Vere McHenry ..	Cowes, Phillip Island
367	„ Prince ..	A	„ ..	R. H. Cumming ..	Bael Bael, *viâ* Lake Charm
232	Stockman's Lad ..	A	„ ..	D. C. Gilsenan ..	Bung Bong
42	Straightaway ..	A	Light ..	T. Allen ..	Narrewillock, *viâ* Glenloth
91	Style O	A	„ ..	Wm. Barry ..	Heathcote
519	Sudbourn's Victory ..	A	Draught ..	A. C. Head ..	Seymour
329	Sunbeam	A	Pony ..	W. Daniel ..	Nagambie
95	Sunbury	A	Light ..	T. C. Nolan ..	Carinya, Tarrawingee
181	Sun Star	6	Pony ..	J. T. Unwin ..	Spring Vale
272	Sweet Abbey ..	A	Light ..	N. Chamberlain ..	Morwell
599	Take Bells ..	A	„ ..	J. Ferguson ..	Redesdale
118	Tam O' Shanter Bill	A	Pony ..	P. Gordon ..	Ellerslie

STALLION REGISTER, 1923-24—*continued*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
192	Tamie O'Groat ..	5	Draught ..	J. McGregor ..	Ballarat East
306	Tatahu	A	Light ..	M. Stephenson ..	29 King-street, Fitzroy
41	Tax Payer ..	A	Pony ..	G. King ..	Scott's Creek
600	The Abbot ..	A	Light ..	A. B. Hamilton ..	Riccarton, Fish Creek
366	,, Crown ..	A	Draught ..	T. G. Martin ..	Kenmare
5	,, Factor ..	A	,, ..	C. Bates ..	Dobie
35	,, Hague ..	A	Thoroughbred	S. Winter-Cooke ..	Hamilton
563	,, Link	6	Draught ..	Taylor, H. E. ..	Nullawil
182	,, Masher ..	4	Pony ..	W. N. MacNicol	Nangella, Casterton
393	,, Premier ..	A	Draught ..	Geo. Taylor ..	Leichardt
269	,, Standard ..	A	,, ..	G. N. Morrish ..	Ouyen
117	,, Starling ..	A	Light ..	S. Farrell ..	Stratford
539	,, Vanquisher ..	A	Thoroughbred	G. W. Horne ..	Yendon
445	,, Warrior ..	A	Pony ..	H. Wilson ..	Wodonga
365	,, Yarra Chief ..	A	,, ..	J. Douthie ..	Woori Yallock
355	Thoughtful ..	A	,, ..	P. McIntosh ..	Ondit
354	Tim Brigham ..	A	,, ..	J. C. Nicoll ..	Binney-street, Euroa
403	Toby	A	,, ..	A. W. Thompson	Monivae station, Hamilton
364	Togo	A	Draught ..	H. Currie ..	Waterloo P.B., Joel Joel
304	Togo's Chief ..	A	,, ..	J. Hefferman ..	Konongwootong, Coleraine
520	Tony	A	Pony ..	D. J. Kennedy ..	Pine-grove, Cobram
330	Toy Bells ..	A	Light ..	W. H. Horn ..	Police Station, Ararat
83	Tracey Alto ..	A	,, ..	E. Rash ..	Box 67, G.P.O., Ballarat
379	Trafalgar	A	Thoroughbred	Executors of W. E. Mitchell	Corryong
217	Tramore	A	,,	McDonald Bros. ..	Mortlake
402	Trelawney Time ..	A	Draught ..	R. H. Larcombe ..	Clifford East, Mt. Moriac
395	Trotting Railway II.	A	Pony ..	Executors of late Captain Staughton	Eynesbury Estate, Milton South
116	True Steel	A	,, ..	A. Young ..	Rathscar
401	Trump	A	,, ..	A. W. Thompson	Hamilton
66	Truro	A	Light ..	J. E. Light ..	Quantong
188	T.T.	A	Thoroughbred	C. Thompson ..	Mildura
167	Udale	A	Draught ..	J. Holdsworth ..	Jung Jung
13	Valmond ..	A	Light ..	E. W. Hamilton ..	Piambie
233	Varco	A	Thoroughbred	W. McMeeken ..	Kerang
200	Venerror	A	Light ..	J. C. Wallis (senr.)	Miram
257	Viking	A	,, ..	A. G. Turnbull ..	Winton, Horsham
291	Viking of Methven ..	A	Pony ..	Mrs. McLellan ..	Dandenong-road, Windsor
386	Vin Direct ..	5	Light ..	J. D. Mulfahey ..	South Melbourne
540	Von Atom II. ..	A	Pony ..	J. A. Padgett ..	Berry Bank

STALLION REGISTER, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
521	Waironga Prince ..	A	Draught ..	G. W. Fielding ..	Watchem
363	Wakepan	A	Light ..	A. W. Johnston	Clear Creek, Eldorado P.O.
168	Warrigal	A	Pony ..	S. S. Baulch ..	Orford
522	Wee Jim	A	,, ..	J. R. Kettyle ..	Castlemaine
169	Welcome Bells ..	A	Light ..	T. J. Splatt ..	Weering
541	Welsh Flyer ..	A	Pony ..	F. Irving ..	Tyrrell Downs
341	Welsh Flyer ..	A	Light ..	P. J. Reid ..	Milawa
115	What Oh	A	Pony ..	R. J. Hill ..	Dandenong
38	Widgiewa Sapper ..	6	Draught ..	F. J. J. Schultz	Cowangie
542	Wigton Again ..	A	,, ..	Con Murphy ..	Oxley
234	William of Orange ..	A	Thoroughbred	A. J. Gray ..	3 Fletcher-street, Essendon
353	Wiltshire	A	Light ..	C. Wood ..	Minyip
400	Windlesham ..	A	Thoroughbred	W. T. Hillman ..	Queen-street, Bendigo
301	Winteriga ..	A	,,	W. Coe ..	Coleraine
258	Wonder	A	Pony ..	Wm. McEvoy ..	Alexandra
170	Wonga	A	Light ..	Emily Parish ..	Horsham
18	Woodland's Beauty	6	Pony ..	E. Fulton ..	Horsham
89	Woodland's Dandy	A	,, ..	G. Aldous ..	Banyena
17	W. W. Estell ..	A	Light ..	J. Hannah ..	Donald
303	Yeneda	A	Thoroughbred	D. A. Hutchison	Yan Yean
360	Young Badaween ..	A	Pony ..	F. Shaw ..	St. Arnaud
259	Young Brigham ..	A	,, ..	W. J. Craig ..	Cobden
171	Young Brigham ..	A	,, ..	A. S. and L. G. Mills	Natte Yallock, *viâ* Avoca
40	Young Clarionet ..	A	Light ..	John Mitchell ..	Piavella P.O., *viâ* Prairie
39	Young Comet ..	A	Pony ..	T. Adkin ..	Greyacres, Korumburra
523	Young Coronation ..	A	Draught ..	G. Pitt ..	Jeparit
36	Young Coronation ..	A	,, ..	W. J. Bennett ..	Cannie Railway Station
548	Young Dundonald ..	A	,, ..	W. H. Bell ..	Bowser
74	Young General ..	A	Pony ..	W. Maddill ..	Tongala
235	Young Ginger ..	A	,, ..	Manifold and Co.	Purrumbete, Weerite
236	Young Hero ..	A	,, ..	F. W. Hender ..	Franklinford
524	Young Hero ..	A	Draught ..	Jas. Branson ..	Lake Cooper
305	Young Linkwood ..	A	,, ..	J. H. Poverill ..	Charlton
270	Young Lord Lyon ..	A	,, ..	H. Chamberlain	Morwell
398	Young Lowrie ..	A	Pony ..	K. McPherson ..	Broadford
216	Young McLeish ..	A	Draught ..	Jas. Charlton ..	Stony Creek
300	Young Nailstone ..	A	,, ..	J. J. Nulty ..	Walpeup
114	Young Repeater ..	A	,, ..	R. N. Johns ..	Danyo
352	Young Royal Oak ..	A	,, ..	H. Walker ..	Merbein
525	Young Shepherd ..	6	,, ..	G. Chapman ..	Minyip
482	Young St. Albans ..	A	,, ..	J. McCormack ..	Roseberry East

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Cultivation.

Orchard ploughing should now be finished, and the main work for the next few months will be an endeavour to keep the soil surface loose, friable, and well opened. The consolidation of the surfaces must be avoided, as a hard, compact surface means the loss of much soil moisture, by capillary attraction. So that after rains, heavy dews, the spray pump and other traffic, it will be as well to run the harrows over the surface of the soil, so as to keep the surface well broken and to maintain a good earth mulch. If the harrows are not sufficient to break the clods, a spiked or heavy roller should be drawn over it, and then harrowed. If the weather is at all dry it is advisable to plough only as much as may be harrowed in the same day. By immediately following up the ploughing with harrowing a minimum amount of moisture is lost by capillarity.

Green manure crops should now be ploughed under, and should they be very abundant in growth, a roller should be run over them and ploughed with a coulter attached. Any of these means will serve to get the crop underground, which is a desideratum.

In addition to the retention of soil moisture, cultivation of the orchards will suppress the weeds which rob the trees of food and moisture. The suppression of weeds is an important work in the spring and summer, and they should be rigorously hoed or cultivated out.

Spraying.

Spraying for all pests and diseases is, at this time of the year, an important work in the orchard. Bordeaux or lime sulphur spraying for the black spot of apples and pears, for scab and shothole in peaches and apricots, for the leaf curl of the peach and rust of the plums and peaches, should now be completed.

Where there are indications that previous sprayings have not been thoroughly successful, a weak lime sulphur spray should be given.

Wherever they are present, nicotine sprays should be given to combat the peach aphis, and the pear and cherry slug. For the latter pest, arsenate of lead should not be used if the cherries are within a month of ripening. Arsenate of lead is so tenacious, and thus it is likely to remain on the fruit until it is ripe, when it would be dangerous to the consumer. Thus, while this property of remaining on the fruit for a considerable time is of great value in the Codlin Moth spraying, it is quite of the opposite value when used for the pear and cherry slug. Either tobacco water or hellebore is useful for the eradication of this pest, as these substances do not remain long on the trees, and they are quite as effective as arsenate of lead. Even a dry dusting with lime or with ordinary soil will keep the slugs in check.

Codling moth spraying, too, will be in evidence this month. It is generally assumed that the appearance of the moth is coincident with the bursting of the flowers. This is not always so—the moths frequently

come slightly later than the blooming period. Owing to the rapid expansion of the fruit, it is well to follow the first spraying with a second in a week or ten days' time. Arsenate of lead is still the spray for the Codlin moth, nothing having been found to supersede it.

Arsenate of lead may be mixed with nicotine sprays, or with Bordeaux mixture, without any detriment to either spray, if necessary.

The Vegetable Garden.

A good tilth, and a well-pulverized soil, are the main soil necessities in the vegetable garden this month. Frequent cultivations will keep in the soil moisture, and will obviate the necessity for surface waterings. At the same time, it should be remembered that the vegetable garden requires more water than the flower garden, owing to the quick growth of the plants. Quickly-grown vegetables are more tender and more luscious than slowly-grown ones: thus a good water supply will need to be maintained. Weeds are great moisture-robbers, and they should be kept out of the vegetable garden at this time of the year.

Late plantings of tomatoes may now be carried out; all early-planted plants should be fed, staked, and the laterals pinched back. A little bone-dust or superphosphate may be given, but these are not equal to animal manures, if the latter are available. Chemical manures should only be given in limited quantities, 6 or 7 cwt. per acre would be a heavy dressing, and this works out at nearly 3 ozs. per square yard. Vegetable growers may easily try this for themselves, and it will soon be seen that 3 ozs. scattered over a square yard of surface will appear to be a very light dressing.

French beans, carrot, parsnip, celery, radish, peas, and turnip seeds may now be sown. Seeds of cucumber, melon, and pumpkin family may now be sown in the open ground. All seedlings may be transplanted on favorable days, and it will be well to sprinkle the tops as well as to water the roots.

Asparagus beds may be top-dressed with manure, and kept well weeded. Such weak growths that are not gathered for eating should be cut out of the beds.

REMINDERS FOR NOVEMBER.

Cattle.—Except on rare occasions, rugs may now be used on cows at night only. Continue giving hay or straw, if possible, to counteract the effect of green grass. Be prepared for milk fever. Read article in *Journal of Agriculture*, November, 1923, page 659. Give calves a dry shed and a good grass run. Continue giving milk at blood heat to calves. Be careful to keep utensils clean, or diarrhœa will result. Do not give too much milk at a time for the same reason. Feed regularly with regard to quantity and time. Give a cup of limewater in the milk to each calf, also place crushed oats or lucerne hay in a trough so that they can eat at will. Provide salt-lick consisting of 20 lbs. bone meal or rock phosphate, 20 lbs. salt, and ½ lb. sulphate of iron.

Pigs.—Supply plenty of bedding in well-ventilated styes. Keep styes clean and dry, and feeding troughs clean and wholesome. Sows may now be turned into grass run. Sows suckling young should be well fed to enable them to produce plenty of milk. Give young pigs pollard and skim milk in separate trough as soon as they will take it, and keep them fattening from the start to get them off as early as possible. Give a tablespoonful of bone meal, or half

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that amount of mineral phosphate per 100 lbs. live weight in food daily. If pigs are lousy dress them with kerosene emulsion or sulphur and lard, rubbing well into crevices of skin, and disinfect styes. Pig breeding and feeding should be very profitable for a long time to come, and it should be safe to launch out now.

BEE-KEEPING.

In most districts, October is the principal swarming month; in late localities, particularly at the higher elevations, most of the swarming takes place in November. Where a honey flow is expected from Redgum or Yellow Box during December and January, it is not wise to make a further increase in the number of colonies by allowing after-swarms to come off and hiving separately, as the parent stock would be too much depleted of bees, and there would not be sufficient time for it to recover, or for the swarms to build up, before the honey flow is on, and much of it would therefore be lost.

After-swarms can best be prevented by hiving the first or prime swarm on the old stand and moving the colony from which it came to a new stand, at the same time destroying all the queen cells in it except one—the most perfect and forward one.

If no increase at all is desired, the parent colony may be left alongside the old stand on which the swarm was hived, but with the entrance facing in a different direction. When the young queen in the swarmed stock is laying, which will be in about three weeks, the hive may be gradually turned round till it faces the same way as the swarm, and, after removing the old queen from the swarm, the two stocks may be re-united, thus making a very strong colony with a young laying queen, in the best condition for storing honey and very unlikely to swarm again the same season.

The uniting of the two stocks is best done towards evening, by first giving both a little smoke between the combs and then alternating them for the time being, so that each comb from the swarm is between two of the old combs, the object being to thoroughly mix the bees. Two or three days after, the combs can be sorted; the best should be selected for the brood chamber and the others put in the upper story. Uniting should not be attempted till after the young queen is laying, otherwise there will be much fighting.

In localities where the colonies have come through the Winter very strong, there is likely to be much swarming wherever Cape Weed or some other pollen-yielding plant is plentiful, the duration of blooming and of swarming depending, of course, upon the weather.

When several days of bad weather follow the hiving of swarms, it may be advisable to feed sugar syrup (one part sugar to one part water) to keep up comb-building and brood-rearing, so as to have the greatest number possible of field bees in the hive during the honey flow later on. Honey should never be used for feeding bees, unless it comes from an apiary which has been absolutely free from disease for at least two years.

VITICULTURE.

Vineyard.—Field grafts require careful attention in the way of removal of suckers and scion roots. (See Bulletin on "Spring Grafting," No. 38, page 29.) Keep a sharp look out for Black Spot and Downy Mildew; whether the latter disease is seen or not, finish spraying by 20th October. A preliminary spray when the bunches are most visible is strongly recommended. In irrigated vineyards make it a rule to *spray immediately before watering.* Information on Black Spot and Mildew will be posted on application. Cultural work, such as scarifying and hoeing, should be actively pushed forward, so as to provide as good a "mulch" as possible during summer. Proceed with tying up, stopping and topping. Avoid excessive topping; summer pruning is often more injurious than useful in warm, dry climates. Young vines especially need judicious handling. Disbudding, though not indispensable, is of great use to shape the vine. Early execution is imperative. *Better not disbud at all than disbud late.* Cincture Zante currant vines after flower caps have fallen. Apply second sulphuring just before blossoming, wherever Oidium was prevalent last year.

Cellar.—Taste all young wines; beware of dangerous symptoms in unfortified fruity wines, which may need treatment. Fill up regularly all unfortified wines

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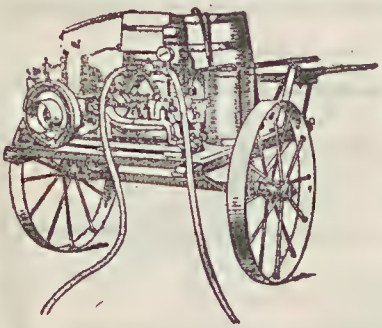

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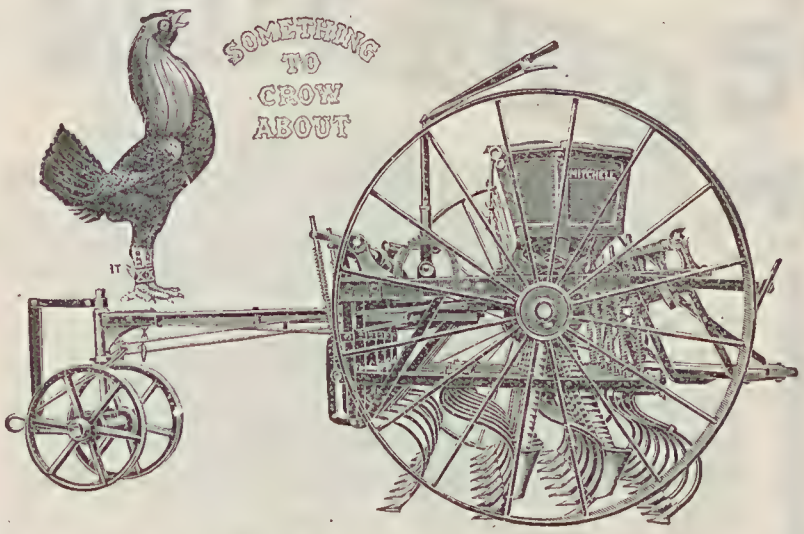

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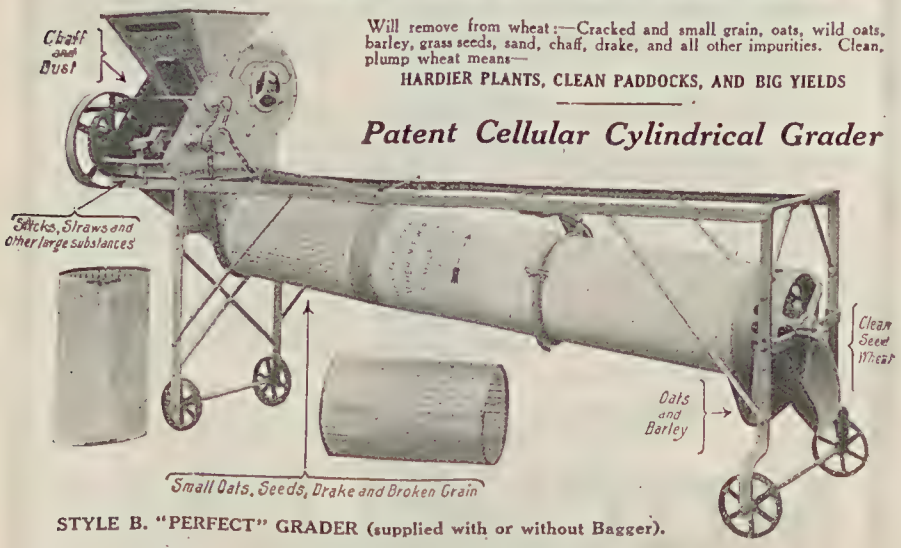
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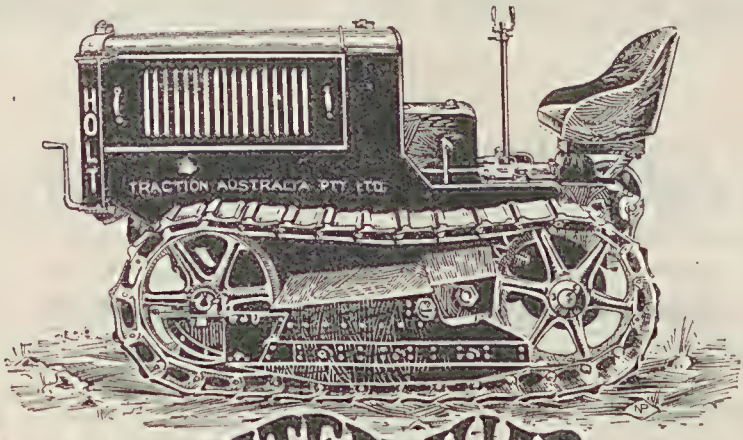

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GOVERNMENT COOL STORES

VICTORIA DOCK

Facilities are provided for producers and smaller exporters of the various kinds of produce, so that direct shipments on their own account may be undertaken. The Government ownership and conduct of Cool Stores places producers in an independent position, and, in addition, preserves an open channel for the carrying on of the export trade in perishable products.

The Department of Agriculture will receive, handle, freeze, store, and ship **Butter, Cheese, Eggs, Fruit, Meat, Poultry, Rabbits and Hares, &c.,** for producers and exporters.

Produce to the value of over **£30,000,000** has been treated at the **Government Cool Stores.**

GOVERNMENT COOL STORES, VICTORIA DOCK (Dudley St.)

Telephones:

Office: 10383 Central. **Superintendent and Engineer-in-Charge: 10382 Central.**

SCALE OF CHARGES, ETC.

and further particulars may be obtained upon application to the

EXPORTS SUPERINTENDENT, DEPARTMENT OF AGRICULTURE, PRODUCE OFFICES, 605-7 FLINDERS STREET, MELBOURNE.

Telephone 9380 Central.

DEPARTMENT OF AGRICULTURE

GOVERNMENT COOL STORES

VICTORIA DOCK

The Stores have a capacity of **743,980 cubic feet insulated,** and are capable of holding **372,000 boxes of butter,** or **248,000 cases of fruit,** or **335,000 carcasses of lamb and mutton.**

Electric motor power totals 900 H.P.

Produce can be placed on conveyors at any point and mechanically carried to any chamber in the building, or conveyed from the chambers direct into the ship's hold.

The Railway Department Goods Sheds are adjacent to and connected with the Cool Stores by direct lines; delay and exposure of produce through shunting in the Spencer-street yards, or cartage, are thus avoided. The Stores are situated in close proximity to the Victoria Dock, where vessels drawing up to 30 feet of water can be berthed; excellent facilities for the efficient and economical treatment and shipment of frozen and perishable products are provided.

Expert Officers are connected with every Branch, so that any one requiring information regarding the production, preparation, and shipment of produce can rely upon being promptly supplied with up-to-date information upon all matters.

Department of Agriculture, Victoria.

PURE FRIESIAN HERD

Bull Calves for Sale

(1) Bull Calf dropped 24th January, 1923

Sire: Victoria Songboy (359) by Dominion Domino Dutch Boy (1206 N.Z.F.H.B.)
Dam: Dominion Belle Corona (369) by Oak de Kol 2nd Homestead Fobes (imp.) (341 N.Z.F.H.B.)

Dam's Record for 273 days under Government Herd Test—
11,646 lbs. Milk, 3·61 Test, 420 lbs. Butter Fat.

For Full Lactation Period—
11,715 lbs. Milk, 3·61 Test, 424 lbs. Butter Fat.

(2) Bull Calf dropped 26th February, 1923

Sire: Victoria Songboy (359) by Dominion Domino Dutch Boy (1206 N.Z.F.H.B.)
Dam: Dominion Proud Lassie (368) by Woodcrest Jo (imp.) (334 N.Z.F.H.B.)

Dam's Record for 273 days under Government Herd Test—
11,336 lbs. Milk, 3·42 Test, 387 lbs. Butter Fat.

For Full Lactation Period—
12,216 lbs. Milk, 3·51 Test, 428 lbs. Butter Fat.

Victoria Songboy's dam Dominion Madrigal's Record for 273 days under Government Herd Test is 11,373 lbs. Milk, 3·93 Test, 448 lbs. Butter Fat; and for Full Lactation Period 13,485 lbs. Milk, 4·17 Test, 563 lbs. Butter Fat.

(3) Bull Calf dropped 3rd May, 1923

Sire: Victoria Jo Patch (345) by Longbeach Big Patch (515 N.Z.F.H.B.)
Dam: Dominion Coringa (380) by Woodcrest Jo (imp.) (334 N.Z.F.H.B.)

Dam's Record for 273 days under Government Herd Test—
13,923 lbs. Milk, 3·58 Test, 499 lbs. Butter Fat.

For Full Lactation Period—
16,373 lbs. Milk, 3·62 Test, 593 lbs. Butter Fat.

(4) Bull Calf dropped 18th May, 1923

Sire: Victoria Jo Patch (345) by Longbeach Big Patch (515 N.Z.F.H.B.)
Dam: Victoria Dutchmaid (991) by Dominion Domino Dutch Boy (1206 N.Z.F.H.B.)

Dam's Record for 273 days under Government Herd Test—
6,054 lbs. Milk, 4·01 Test, 243 lbs. Butter Fat.

For Full Lactation Period—
7,156 lbs. Milk, 4·06 Test, 290 lbs. Butter Fat.

Victoria Jo Patch's dam is also Dominion Madrigal (record as above).

INSPECTION of these Bull Calves at the Horticultural Gardens, Burnley, is invited.

APPLICATION FOR PURCHASE to Dr. S. S. Cameron, Director of Agriculture, Melbourne.

DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department will shortly have completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter ***fat*** yielded.

(For Record of Yields of dams see Red Poll Herd Book.)

The Bulls in Use include—

LONGFORD MAJOR (Imported)

Dam's Record 14713 lbs. milk ... 6 years average 11338 lbs. milk
G. Dam's ,, 10548 ,, ... 4 ,, ,, 9135 ,,

BELLIGERENT (Imported)

Dam's Record (1st milking) 7144 lbs. milk.

Dam's Dam's	,,	14533 lbs. milk	...	4 years average	12871 lbs. milk
Sire's Dam's	,,	10370 ,,	...	7 ,, ,,	9354 ,,
Sire's D. Dam's	,,	9510 ,,	...	12 ,, ,,	8033 ,,
G. Sire's D. Dam's	,,	10215 ,,	...	7 ,, ,,	9386 ,,
G.G. Sire's D. Dam's	,,	12565 ,,	...	10 ,, ,,	8853 ,,
G.G.G. Sire's D. Dam's	,,	10088 ,,	...	2 ,, ,,	9754 ,,

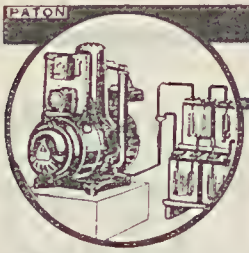
Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

Application for purchase to

Dr. S. S. CAMERON, DIRECTOR OF AGRICULTURE, MELBOURNE.

PATON 16314



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We are convinced that for Australian conditions no strain of imported seed can compare with the best of our own local saved Lucerne. This has been proved in our own Trial Grounds, in Government Tests, and by the experience of all large users, and is even confirmed in other countries in which climatic conditions are similar, where our Lucerne seed has proved to come quicker in the Spring and give a later cut in the Autumn than any other strain. We cannot recommend and therefore do not stock imported Lucerne seed of any description, nor do we stock local seed which has been grown on irrigation areas.

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The guarantee of this to a Case Tractor buyer, is our Engineering Service—trained men backed by well-equipped Engineering Workshops. What this service means to the Farmer, may be judged by the following fact.

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